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ABSTRACT

This document contains the following papers: "Cognitive Abilities of Oak Harbor High School Agricultural Education Students" (Mark F. Starkey, Jamie Cano); "Development and Evaluation of Hands-on Learning Activities in Indiana High School Animal Science Classes" (Kendra Koster, Mark A. Balschweid); "Teaching Biology Using Agriculture as the Context: Perceptions of High School Students" (Mark A. Balschweid); "Assessing and Comparing the Scheduling Systems Utilized by Agricultural Education Programs in Illinois" (Andrew J. Baker); "Characteristics of Elementary Teachers Explaining Integration of Agricultural Awareness Activities in the Curriculum" (Neil A. Knoblock, Robert A. Martin); "Stakeholder Perceptions of Their Transition to an Agricultural Magnet School in the Midwest: A Case Study" (Linda Moody, Lloyd C. Bell); "Expert Perceptions of the Future of Agricultural Education in Illinois" (Joe G. Harper, Bret Hitchings); "Leading Like a Woman in a Man's World: Women's Conceptualizations of Leadership in the Agricultural Industry" (Amanda E. Corn); "Structuring Agricultural Education Research Using Conceptual and Theoretical Frameworks" (James E. Dyer, Penny S. Haase Wittler, Shannon G. Washburn); "Attitude of Vocational Teachers Towards Teacher Evaluation" (Jamie Cano, Barrett Zimmerman); "The Impact of Participating in Freshmen Interest Groups and Agricultural Youth Organizations on Agriculture Students' Academic Performance and Retention" (Anna L. Ball, Bryan L. Garton, James E. Dyer); "Relationship between Learning Style and Personality Type of Students Majoring and Minoring in Agricultural Education at The Ohio State University" (Tracy Kitchel, Jamie Cano); "Agricultural Extension Educators' Perceptions regarding Teaching Methods and Tools for Educating Farmers about Sustainable Agricultural Practices" (K.S.U. Jayaratne, Robert A. Martin); "Assessing and Prioritizing Present Inservice Needs and Evaluating Past Inservicing Programming Designed for Illinois Agricultural Education Instructors" (Andrew J. Baker); "Job Satisfaction among Agricultural Teacher Educators: New Directions in Measurement" (Jamie X. Castillo, Jamie Cano); "An Assessment of Desktop Videoconferencing [illegible] Agricultural Education Graduate Assistant Teacher

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Supervision in Agricultural Education" (John Kessell, Greg Miller); "Characteristics of Learners Explaining the Benefit of Student Interaction in a Distance- and Technology-Situated Environment" (Neil A. Knobloch); and "The Professional Development Needs of Kansas Teachers of Agriculture" (Shannon G. Washburn, Brad O. King, Bryan L. Garton, Steven R. Harbstreit). Each paper is followed by a one-page critique by either Rosemary Gleim, Mark Zidon, R. Kirby Barrick, or Lloyd C. Bell. Most papers include substantial bibliographies. (MN)

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ED 475 348

AAAE Central Region Agricultural Education Research Conference

Presented Papers and Paper Critiques

Research: Providing Answers for the New Millennium

February 23, 2001
Adam's Mark Hotel
St. Louis, Missouri

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Edited by:

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Facilitator: Wes Budke, The Ohio State University

Preface

The AAAE Central Region Agricultural Education Research Conference and Seminar was conducted as a joint venture February 22 - 24, 2001, at the Adam's Mark Hotel in St. Louis, MO.

The AAAE Central Region Research Conference is a major forum for disseminating results of research and scholarly activity within the Central Region of the American Association of Agricultural Education (AAAE). The fifty-fifth annual research conference involved the presentation of papers selected through a blind review process. Reviewers from within AAAE who were outside the Central Region or agricultural education professionals who were non-AAAE members were asked to review paper proposals submitted for consideration. These individuals are noted in the Acknowledgements section of this publication.

Twenty-six paper proposals were reviewed for consideration with eighteen papers accepted based upon the evaluations and recommendations from reviewers. The acceptance rate for papers presented at the 2001 AAAE Central Region Research Conference was 69 percent. Four criteria were used for decision-making regarding acceptance of papers for the Conference. The criteria included:

1. Followed paper specifications
2. Ranked among the highest papers by reviewers
3. Achieved at least one ranking of either a "four" or "five"
4. Achieved an average rating of 3.00 or higher

Authors of papers accepted for presentation at the research conference were asked to prepare conference papers utilizing the comments and suggestions received from the review process and to follow guidelines provided by the conference chair. Papers selected for presentation are listed in the table of contents in the order presented.

Papers selected for presentation at the research conference were forwarded to one of six discussants selected from within the AAAE Central Region who were asked to review three papers and submit written comments that are printed in the conference proceedings. Written comments provided by discussants appear immediately following each paper.

Three papers were presented at each of six concurrent research sessions. Discussant comments were presented orally following the conclusion of the three paper presentations. Following the discussant's comments, presenters were provided the opportunity to respond to questions raised by the discussant. The session chairperson was then asked to serve as a moderator to lead a group discussion involving members of the audience, the paper presenters, and the discussants for the remainder of the session.

Conference Schedule

2001 AAAE Central Region Research Conference and Seminar
St Louis Adam's Mark Hotel
February 22 - 24, 2001

Thursday, February 22, 2001

7:00 – 9:00 p.m.	Registration - Research Conference and Seminar
7:00 – 8:00 p.m.	Registration - Undergraduate Conference

Friday, February 23, 2001

7:30 - 8:30 a.m.	Registration - Research Conference and Seminar
7:30 - 8:15 a.m.	Buffet Breakfast – Included with Registration
8:30 - 10:00 a.m.	Research Concurrent Session A
8:30 - 10:00 a.m.	Research Concurrent Session B
10:00 - 10:20 a.m.	Break
10:25 - 11:55 a.m.	Research Concurrent Session C
10:25 - 11:55 a.m.	Research Concurrent Session D
12:00 - 1:15 p.m.	Lunch – Included with Registration Speaker, Dr. Mac McCaslin – "Agricultural Education: Retrospect and Prospect"
1:30 - 2:30 p.m.	Poster Session/Refreshments
2:45 - 4:15 p.m.	Research Concurrent Session E
2:45 - 4:15 p.m.	Research Concurrent Session F
4:30 - 5:30 p.m.	AAAE General Session Business Meeting Committee Meetings (Research, Program Improvement, Professional Development & Communications)
5:30 - 7:30 p.m.	Dinner - On Your Own
7:30 – 9:00 p.m.	Graduate Student Session

Saturday, February 24, 2001

8:30 – 10:00 a.m.	AAAE General Session Professional Development Concurrent Session A Professional Development Concurrent Session B
10:00 - 10:30 a.m.	Break
10:30 - 12:00 p.m.	AAAE General Session Business Meeting Committee Reports: Research, Program Improvement, Professional Development, Communications Elections

Acknowledgements

Twenty-six paper proposals were received and eighteen papers were accepted for presentation at the 2001 AAAE Central Region Research Conference in Agricultural Education. Reviewers from the AAAE Regions outside the Central Region or non-AAAE members read each paper proposal as part of the blind review process. Independent recommendations and numerical ratings were utilized to select papers for presentation. Sincere gratitude and appreciation is extended to the following individuals who served as external reviews for the 2001 AAAE Central Region Research Conference in Agricultural Education:

Dr. Antoine Alston	North Carolina A&T State University
Dr. Harry N. Boone, Jr.	West Virginia University
Dr. Barry Boyd	Texas A&M University
Dr. Gary E. Briers	Texas A&M University
Dr. Susan Camp	State University of New York
Dr. James E. Christiansen	Texas A&M University
Dr. Carol A. Conroy	Cornell University
Dr. Rosemary Gliem	The Ohio State University
Dr. John Hillison	Virginia Tech
Dr. Jeffrey Horne	Southern Arkansas University
Dr. David Howell	University of New Hampshire
Dr. Dr. Carl Igo	Southwest Texas State University
Dr. Maynard Iveson	University of Georgia
Dr. Bill Kellogg	California Polytechnic State University, San Luis Obispo
Dr. Marvin Kleene	Washington State University
Dr. David Lawver	Texas Tech University
Dr. Bruce Miller	Utah State University
Dr. John Mundt	University of Idaho Boise Center
Dr. Don Peasley	Mohawk Regional Information Center, New York
Dr. Dale Safrit	The Ohio State University
Dr. Kitty-Sue Schlink	University of Idaho
Dr. James Smith	Texas Tech University
Dr. Michael K. Swan	Washington State University
Dr. Robert Torres	New Mexico State University
Dr. Douglas A. Ullrich	Sam Houston State University

Information and materials provided by Dr. Joe Harper, University of Illinois, were invaluable in organizing the conference. Appreciation is expressed to Ms. Susan Thomason, Ms. Velma Cordial, and Dr. Mac McCaslin for their assistance with program materials and conference details. I also would like to thank the authors of the paper proposals submitted for consideration in following paper specifications, procedures, and timelines. Appreciation is also extended to the session chairs, discussants and facilitators for their expert help and cooperation in enhancing the quality of the conference and in helping to make it run smoothly.

Joe A. Gliem, 2001 Conference Chair

Future University Schedule for Hosting the AAAE Central Region Research Conference and Seminar

2002	Kansas
2003	Wisconsin
2004	Iowa
2005	Missouri
2006	North Dakota
2007	Nebraska
2008	Minnesota
2009	Indiana
2010	South Dakota
2011	Michigan
2012	Illinois
2013	Ohio

COGNITIVE ABILITIES OF OAK HARBOR HIGH SCHOOL AGRICULTURAL EDUCATION STUDENTS

Introduction/Theoretical Framework

Torres (1999) indicated that "since the formation of public education, no other student outcomes have been more cherished than a student's ability to reason, solve problems, and think independently" (p. 338). In addition, Cano (1988) reported that public schools should be dedicated to the preservation of society through the education of our youth. Furthermore, it was imperative that "public school teachers teach the fundamental skills and develop attitudes and habits that will help the student to be a useful citizen in our democracy" (Cano, 1988, p. 1).

The National Commission on Excellence in Education prepared a report, A Nation at Risk (1983), which brought about an awareness that the educational needs of learners in America were not being met. Areas of specific importance, as indicated by the Commission, were problem solving ability and critical thinking skills of learners. The Commission reported that sixty-five (65) percent of the group studied could not solve mathematical problems requiring more than one step. Furthermore, the Commission reported that many learners could not draw inferences from written materials. These findings, along with others, influenced the Commission to make recommendations to improve learners' critical thinking skills, problem solving abilities, and higher order thinking abilities.

Teaching learners how to analyze, think critically, and solve problems has been a goal of educators in agriculture (Cano, 1988, Flores, 1995; Miller, 1989; Newcomb & Trefz, 1987; Torres, 1993). Harl (1980) suggested that every learner of agriculture should possess the ability to "...think and reason – creatively, analytically, thoroughly and with reasonable alacrity" (p. 5). Furthermore, Poulton (1985) purported that quality agricultural education programs should develop and teach learners to think logically and apply problem solving techniques where applicable.

Despite all of this, educational literature has suggested that emphasis in schools was placed on teaching learners facts, even though teachers and curriculum planners agreed that teaching learners to think was extremely important (Gall, 1970; Roberts, 1974, cited in Cano, 1988). In addition, Cano and Martinez (1991) claimed that past research indicated that most students showed little evidence of critical thinking abilities when solving problems. In fact, Day (1981, cited in Cano & Martinez, 1991) purported that most students continued to operate in a concrete operational manner. Furthermore, Cano (1988) stated that agricultural educators did not know at which level of cognition learners were performing, nor did they know their learners' cognitive abilities.

Nelson and Scanlon (1977; cited in Cano, 1988) reported that preparing students for work was an important function of education. However, studies (Cano, 1988; Miller,

1989; Miller & Cano, 1986; Torres, 1993) have indicated that students of agriculture, upon graduation, were ill prepared in terms of knowledge and cognitive abilities for the workplace. Miller and Cano (1986) reported that agribusiness owners/managers indicated that students graduating from high school agricultural education courses did not possess the knowledge and skills required for today's agriculture. Furthermore, Torres (1993) and Flores (1995) found that there was room for improvement in terms of students' cognitive abilities.

Not only was the lack of knowledge and skills a problem of learners upon graduation, but critical thinking abilities, problem solving abilities, and higher order thinking skills were also identified as being underdeveloped (Miller, 1989). Miller (1989) reported that "Teaching students how to think, or developing their critical thinking and problems solving skills" (p. 5) was identified as a goal of educators. In addition, Bransford and Vye (1989) claimed that "...many traditional approaches to instruction do not help students make the transformation from 'knowing that' something is true to 'knowing how' to think, learn, and solve problems" (p. 193). Similarly, Lochhead & Clement (1979) claimed that "We should be teaching students how to think; instead we are primarily teaching them what to think" (p. 1).

Furthermore, Bloom, Engelhart, Furst, Hill, & Krathwohl (1956) reported that although the acquisition of basic information or knowledge was recognized as an important outcome of education, what was needed was the development of critical thinking skills and problem solving abilities. In conclusion, Bloom et al. (1956) stated that "much emphasis must be placed in the schools on the development of generalized ways of attacking problems and on knowledge which can be applied to a wide range of situations. That is, we have the task of preparing all individuals for problems that cannot be foreseen in advance, and about all that can be done under such conditions is to help the student acquire generalized intellectual abilities and skills which will serve him (sic) well in many new situations" (p. 40).

Researchers such as Thorndike (1931) and Thurstone and Thurstone (1941) utilized factor analysis to identify single underlying traits or influences of the generally ill-defined term "intelligence" (Caplan et al., 1997; Cattell, 1971; Halpern, 1992). Thorndike (1931) found three to four main groupings of abilities or "intelligences" (Cattell, 1971). In addition, Thurstone and Thurstone (1941) found three factors, or abilities, very similar to Thorndike's (1931). The abilities found by Thorndike (1931) and Thurstone and Thurstone (1941) were verbal, number or quantitative, and perceptual or spatial. Verbal abilities, quantitative abilities, and spatial abilities were then considered to be cognitive abilities and were "thought of as the 'underlying dimensions' of intelligence" (Halpern, 1992, p. 9).

On the contrary, cognitive ability tests did not measure intelligence or what has been interpreted from intelligence test scores. Beggs and Mouw (1989) clearly stated that assessments of cognitive abilities, as measured by the Developing Cognitive Abilities Test (DCAT) did not measure stable traits that were commonly interpreted from intelligence test scores. Beggs and Mouw (1989) claimed that their cognitive abilities

test was intended to assess those characteristics that could be altered in the school environment. Because of the nature of what ability tests measured, Beggs and Mouw (1989), and Halpern (1992), suggested that the correlation between cognitive ability tests and achievement tests was high. Halpern (1992) suggested that caution be used in drawing conclusions from ability tests due to the blurry distinction between ability and achievement.

"Underlying (cognitive) abilities are abstract constructs" (Halpern, 1992, p. 10). Abstract constructs were what was intended to be measured in cognitive ability tests. Cognitive ability tests were developed to assess the likelihood of an individual's ability to succeed at certain tasks in the future if that individual were given proper instruction, and if that individual were also motivated to learn and demonstrate the skills needed to perform the task (Halpern, 1992). Cognitive abilities could then be thought of as "the ability to benefit from instruction in a certain area" (Halpern, 1992, p. 11). The following will explain what was intended by each of the three commonly measured cognitive abilities. The three commonly measured cognitive abilities were: verbal abilities; mathematical or quantitative abilities; and, spatial abilities.

Verbal ability was reported as an individual's ability to: decipher the meanings of words in the form of definitions, synonyms, or antonyms; appropriately use words and phrases in the construction of meaning in sentences; and, perceiving interrelationships among a series of statements, making inferences from context, or forming conclusions through prepositional reasoning about given information (Beggs & Mouw, 1989). In addition, Beggs and Mouw (1989) indicated that quantitative ability was an individual's ability to: understand arithmetic operations of addition, subtraction, multiplication, and division along with basic geometric and trigonometric operations of addition, subtraction, multiplication, and division along with basic geometric and trigonometric operations; perceive mathematical relationships embedded in the logic of problems, retrieve the appropriate mathematical operation from memory, and apply the principle to obtain the solution; and transform the information into relationships that will correctly solve a problem. Furthermore, spatial ability was purported as an individual's ability to: recognize and retain such characteristics of size, shape, symmetry, and pattern; estimate or predict what would occur when one or more objects change in location or position; and, make abstract (mental) transformations of objects (Beggs & Mouw, 1989).

Purpose and Objectives

The purpose of the study was to describe the cognitive abilities of students enrolled in Agricultural Education at Oak Harbor High School. Furthermore, the study sought to relate cognitive abilities to specific student characteristics. In order to achieve the purpose of the study, the following research objectives were formulated.

1. Describe students enrolled in Agricultural Education at Oak Harbor High School based on the following personological characteristics: grade level, gender, and cumulative grade point average (CGPA).

2. Determine the level of cognitive abilities (Basic, Application, and Critical Thinking) of students enrolled in Agricultural Education at Oak Harbor High School as measured by the Developing Cognitive Abilities Test (DCAT), Level L.

3. Determine the content area cognitive abilities (Verbal, Quantitative, and Spatial) of students enrolled in Agricultural Education at Oak Harbor High School as Measured by the DCAT, Level L.

4. Describe the relationship between level of cognitive abilities (Basic, Application, and Critical Thinking) utilizing the DCAT, Level L, and selected student characteristics (grade level, gender, and cumulative grade point average) of students enrolled in Agricultural Education at Oak Harbor High School.

5. Describe the relationship between content area cognitive abilities (Verbal, Quantitative, and Spatial) utilizing the DCAT, Level L, and selected student characteristics (grade level, gender, and cumulative grade point average) of students enrolled in Agricultural Education at Oak Harbor High School.

Methods/Procedures

The study was descriptive and correlational in design. The Developing Cognitive Abilities Test, Level L (Beggs & Mouw, 1989), was used to collect information on cognitive abilities. Personological information was gathered through a brief information sheet. The population of this study was students enrolled in Agricultural Education at Oak Harbor High School during the 1999-2000 academic year (N = 153). Useable data was collected from 137 (n = 137) students, yielding a useable response rate of 89.5%. Students absent on the day of data collection were considered non-respondents. There was no further pursuit of data from non-respondents.

The Developing Cognitive Abilities Test (DCAT) was developed along a format which included both a cognitive taxonomy and a content area taxonomy (Beggs & Mouw, 1989). Therefore, the DCAT fielded test scores on two (2) dimensions: cognitive levels and specific content areas. The cognitive levels of the DCAT were consistent with the cognitive domains purported by Bloom, Engelhart, Furst, Hill, and Krathwohl (1956), excluding the evaluation level of Bloom's taxonomy (Bloom et al., 1956). The three (3) content areas in the DCAT were similar to those found in traditional ability tests; Verbal, Quantitative, and Spatial (Beggs & Mouw, 1989). In total, the DCAT consisted of eighty-one (81) items, twenty-seven (27) items in each of the three cognitive levels or twenty-seven (27) items in each of the three specific content areas. The DCAT is a timed testing which 60 minutes was required for administration.

Content validity for the DCAT, considered a standardized instrument, was established utilizing a panel of experts. Reliability estimates as a measure of internal consistency were .80 for verbal, .84 for quantitative, and .75 for spatial. Reliability

estimates for the basic, application, and critical thinking cognitive levels were stated at .81, .76, and .75, respectively. The overall reliability estimate for the DCAT was .90 (Wick, 1990).

A brief information sheet was developed by the researchers to gather personological data from all students involved in the study. Data assessed by this instrument were gender, grade level, and cumulative grade point average (CGPA). In order to ensure accuracy of personological data, personological data were obtained from official high school records.

Data for the study were collected in intact Agricultural Education classes at Oak Harbor High School. Due to block scheduling, data collection was completed during students' regularly scheduled Agricultural Education class times.

Raw scores were coded and entered into SPSS/PC+, Version 10.0 for Windows. Frequencies, percents, means, and standard deviations were used to describe the data. Pearson-product moment and point-biserial were used to describe relationships among the data. Due to the limitations of the study, no attempts should be made to generalize the data to other Agricultural Education students.

Results/Findings

The data indicated that 39.4% (54) of Oak Harbor High School Agricultural Education students were in the ninth (9^{th}) grade. In addition, 26.3% (36) of Oak Harbor High School Agricultural Education students were in the tenth (10^{th}) grade. The percent of Agricultural Education students at Oak Harbor High School in the eleventh (11^{th}) grade was found to be 16.1% (22). Likewise, the data indicated that 18.2% (25) of Agricultural Education students at Oak Harbor High School were in the twelfth (12^{th}) grade (Table 1). Furthermore, a gender analysis showed that 32.1% (44) of Oak Harbor High School Agricultural Education students were female, whereas 67.9% (93) were male (Table 2).

Table 1: Grade Level of Oak Harbor High School Agricultural Education Students (n = 137)

Grade	Frequency	Percent (%)
9	54	39.4
10	36	26.3
11	22	16.1
12	25	18.2
Total	137	100.0

Table 2: Gender of Oak Harbor High School Agricultural Education Students (n = 137)

Gender	Frequency	Percent (%)
Female	44	32.1
Male	93	67.9
Total	137	100.0

Oak Harbor High School Agricultural Education students had a mean cumulative grade point average of 2.73, with a standard deviation of .82. Further analysis of grade point average data indicated that 2.2% (3) of Oak Harbor High School Agricultural Education students had a cumulative grade point average of .99 or less, 15.3% (21) had a cumulative grade point average between 1.00 and 1.99, 40.1% (55) had a cumulative grade point average between 2.00 and 2.99, 37.2% (51) had a cumulative grade point average between 3.00 and 3.99, and 5.1% (7) had a cumulative grade point average greater than or equal to 4.00 (Table 3).

Table 3: Grade Point Averages of Oak Harbor High School Agricultural Education Students (n = 137)

Grade Point Average	Frequency	Percent (%)
$\leq .99$	3	2.2
1.00-1.99	21	15.3
2.00-2.99	55	40.1
3.00-3.99	51	37.2
≥ 4.00	7	5.1
Total	137	100.0

Mean = 2.73
Standard Deviation = .82

The DCAT provided scores on three levels of cognitive abilities: Basic Cognitive Abilities; Application Abilities; and, Critical Thinking Abilities. The maximum possible score for each of the three levels of cognitive abilities (Basic Cognitive Abilities, Application Abilities, and Critical Thinking Abilities) was twenty-seven (27). An analysis of Basic Cognitive Abilities scores yielded a mean of 12.39 with a standard deviation of 3.88 (Table 4). An examination of Application Abilities scores yielded a mean of 13.26 with a standard deviation of 4.39 (Table 4). Furthermore, analysis of Critical Thinking Ability scores yielded a mean of 10.49 with a standard deviation of 3.8 (Table 4).

Table 4: Cognitive Level of Oak Harbor High School Agricultural Education Students (n = 137)

Cognitive Level	Mean	Standard Deviation
Basic Cognitive Ability	12.39	3.88
Application Ability	13.26	4.39
Critical Thinking Ability	10.49	3.80

The Developing Cognitive Abilities Test (DCAT) also yielded scores based on three specific content area cognitive abilities. The three specific content areas were Verbal Ability, Quantitative Ability, and Spatial Ability. The maximum possible score on each of the three content areas (Verbal Ability, Quantitative Ability, and Spatial Ability) was twenty-seven (27). The analysis on Verbal Ability yielded a mean of 13.91 with a standard deviation
of 4.49 (Table 5). Results of students' Quantitative Ability yielded a mean of 12.19 with a standard deviation of 4.58 (Table 5). The mean score for Spatial Ability was found to be 10.1 with a standard deviation of 3.76 (Table 5).

Table 5: Specific content Area Cognitive Ability of Oak Harbor High School Agricultural Education Students (n = 137)

Specific Content Area	Mean	Standard Deviation
Verbal Ability	13.91	4.49
Quantitative Ability	12.19	4.58
Critical Thinking Ability	10.10	3.76

Pearson product-moment correlation coefficients (r) were calculated to describe the relationship between students' level of cognitive ability (Basic Cognitive Ability, Application Ability, and Critical Thinking Ability) and grade level and cumulative grade point average. Point-biserial correlation coefficients (r_{pb}) were calculated to describe the relationship between levels of cognitive ability (Basic Cognitive Ability, Application Ability, and Critical Thinking Ability) and gender. Davis' (1971) conventions were utilized to interpret the magnitude of the relationships described. Correlations were based on the sample size of 137 (n = 137).

An analysis of the correlation between Basic Cognitive Ability and grade level showed a significant, positive, and low relationship (r = .17). Similarly, a significant, positive, and low relationship (r = .26) was found between Application Ability and grade level. In addition, a significant, positive, and low relationship (r = .19) was also found between Critical Thinking Ability and grade level (Table 6).

Analysis of the correlation between Basic Cognitive Ability and cumulative grade point average yielded a significant, positive, and moderate relationship (r = .33). The

relationship between Application Ability and cumulative grade point average was also found to be significant, positive, and moderate (r = 33). The relationship between Critical Thinking Ability and cumulative grade point average was significant, positive, and low (r = .29) (Table 6).

Table 6: Relationship Between Levels of Cognitive Ability and Grade Level, Cumulative Grade Point Average (CGPA), and Gender (n = 137)

Variable	Grade Level	Cumulative Grade Point Average	Gender
Basic Cognitive Ability	.17*	.33*	-.28*
Application Ability	.26*	.33*	-.29*
Critical Thinking Ability	.19*	.29*	-.21*

*p< .05 level

Point-biserial correlation coefficients were calculated to describe the relationship between levels of cognitive ability (Basic cognitive Ability, Application, Ability, and Critical Thinking Ability) and gender. The relationship between Basic Cognitive Ability and gender was found to be significant, negative, and low (r_{pb} = -.28). In addition, a significant, negative, and low relationship (r_{pb} = -.29) was found between Application Ability and gender. Furthermore, a significant, negative, and low relationship (r_{pb} = -.21) was also found between Critical Thinking Ability and gender (Table 6).

Pearson product-moment correlation coefficients (r) were calculated to describe the relationship between students' content area cognitive ability (Verbal Ability, Quantitative Ability, and Spatial Ability) and grade level and cumulative grade point average. Point-biserial correlation coefficients (r_{pb}) were calculated to describe the relationship between content area cognitive ability (Verbal Ability, Quantitative Ability, and Spatial Ability) and gender. Davis' (1971) conventions were utilized to interpret the magnitude of the relationships described. Correlations were based on the sample size of 137 (n = 137).

A significant, positive, and low relationship (r = .24) was found between Verbal Ability and grade level. A significant, positive, and low relationship (r = - .18) was also found between Quantitative Ability and grade level. A positive and low relationship (r = .14) was found between Spatial Ability and grade level (Table 7).

Analysis of the relationship between Verbal Ability and cumulative grade point average identified a significant, positive, and low relationship (r = .25). A significant, positive, and moderate relationship (r = .40) was found between Quantitative Ability and cumulative grade point average. The relationship between Spatial Ability and cumulative grade point average was found to be significant, positive, and low (r = .25) (Table 7).

Table 7: Relationship Between Content Area Cognitive Ability and Grade Level, Cumulative Grade Point Average (CGPA), and Gender of Oak Harbor High School Agricultural Education Students (n = 137)

Variable	Grade Level	Cumulative Grade Point Average	Gender
Verbal Ability	.24*	.25*	-.41*
Quantitative Ability	.18*	.40*	-.17
Spatial Ability	.14	.25*	-.12

*p< .05 level

Point-biserial correlation coefficients were calculated in order to describe the relationship between content area cognitive ability (Verbal Ability, Quantitative Ability, and Spatial Ability) and gender. A significant, negative, and moderate relationship (r_{pb} = -.41) was found between Verbal Ability and gender. A negative and low relationship (r_{pb} = -.17) was found between Quantitative Ability and gender. Similarly, a negative and low relationship (r_{pb} = -.12) was found between Spatial Ability and gender (Table 7).

Conclusions/Implications/Recommendations

Based on the interpretation of the results of the study, the following conclusions and implications were drawn.

Conclusions

1. The largest groups of Oak Harbor High School Agricultural Education students were freshmen and male. Furthermore, Oak Harbor High School Agricultural Education students had a mean cumulative grade point average of 2.73.

2. Based on levels of cognitive ability mean scores, Oak Harbor High School Agricultural Education students scored highest on Application Ability and lowest on Critical Thinking Ability. Converting the cognitive ability level mean raw scores into percentages yielded a mean raw score percent of fifty (50) percent or less in all three cognitive ability levels. Furthermore, capacity for improvement was needed most in Critical Thinking Abilities.

3. Based on specific content area mean scores, Oak Harbor High School Agricultural Education students scored highest on Verbal Ability and lowest on Spatial Ability. Converting the content area mean raw scores into percentages yielded a mean raw score percent of fifty-one (51) or less in all three specific content areas. Furthermore, capacity for improvement was needed most in Spatial Abilities.

4. It could be concluded that grade level, cumulative grade point average, and gender were all significant predictors of the three levels of cognitive abilities (Basic, Application, and Critical Thinking).

5. With the exception of Spatial Ability, personological data, such as grade level, cumulative grade point average, and gender, were all good predictors of content area cognitive abilities (Verbal and Quantitative).

Implications

1. Beggs and Mouw (1989) indicated that the DCAT could be used to identify strengths, weaknesses, and abilities that could be developed through instructional intervention. Based on the conclusion that students' mean score was less than fifty (50) percent on all three levels of cognitive ability implied that Oak Harbor High School Agricultural Education students, as a whole, have the capacity for improvement in Basic Cognitive Ability, Application Abilities, and Critical Thinking Abilities through instructional intervention.

2. Based on the conclusion that students' mean score was less than fifty-one (51) percent on all three specific content areas implied that Oak Harbor Agricultural Education students, as a whole, have the capacity for improvement in Verbal Ability, Quantitative Ability, and Spatial Ability through instructional intervention.

3. Halpern (1992) and Pascarella (1985) indicated that student attributes such as grade level, cumulative grade point average, and gender should be considered as characteristics that could potentially influence cognitive ability. With respect to levels of cognitive ability, the data of the current study supported Halpern's (1992) and Pascarella's (1985) claims.

4. Halpern (1992) and Pascarella (1985) indicated that student attributes such as grade level, cumulative grade point average, and gender should be considered as characteristics that could potentially influence cognitive ability. With respect to specific content area cognitive ability, excluding Spatial Ability, the data of the current study supported these claims.

Recommendations

1. Instructional intervention should occur to strengthen cognitive development at all three levels of cognitive ability at Oak Harbor High School (Basic, Application, and Critical Thinking). Agricultural Education instructors should place more emphasis on higher order thinking skills and include classroom activities requiring abilities in analysis and synthesis. Furthermore, Oak Harbor High School agriculture instructors should provoke student involvement to stimulate student thinking at the higher levels of cognition.

2. Beggs and Mouw (1989) indicated that spatial skills were seemingly the least emphasized skills in schools and were typically not as much a part of the school curriculum as were reading (Verbal) and arithmetic (Quantitative). Therefore, instruction at Oak Harbor High School should occur that develops spatial skills, such as the recognition and retention of size, shape, symmetry, and pattern.

3. Oak Harbor High School agricultural educators should strongly consider student attributes, such as grade level, cumulative grade point average, and gender in planning and delivering instruction.

References

Beggs, D., & Mouw, J. (1989). Assessing dimensions of ability. In American Testronics, Developing Cognitive Ability Test: Comprehensive Assessment Program. Chicago: American Testronics.

Bloom, B., Englehart, M., Furst, E., Hill, W., & Krathwohl, d. (1956). Taxonomy of educational objectives-handbook 1: Cognitive domain. New York: David McKay Company, Incorporated.

Bransford, J., & Vye, N. (1989). Cognitive research and its implications for instruction. In L. Resnick & L. Klopfer (Eds.). Toward the Thinking Curriculum: Current cognitive Research. Alexandria, VA: Association for Supervision and Curriculum Development.

Cano, J. (1988). Assessment of the level of cognition of instruction and student performance in selected production agriculture programs in Ohio. Unpublished doctoral dissertation, The Ohio state University, Columbus.

Cano, J., & Martinez, C. (1991). The relationship between cognitive performance and critical thinking abilities among selected agricultural education students. Journal of Agricultural Education, 32(1), 24-29.

Caplan P., Crawford, M., Hyde, J., & Richardson, J. (1997). Gender Differences in Human Cognition. New York: Oxford University Press.

Cattell, R. (1971). Abilities, their structure, growth, and action. New York: Houghton Mufflin Company. Claxton, C., & Murrell, P. (1987). Learning Styles: Implications for Improving Education Practices. (ASHE-ERIC Higher Education Report No. 4). Washington, DC: Association for the Study of Higher Education.

Davis, J. (1971). Elementary survey analysis. Englewood Cliffs, NJ: Prentice Hall, Incorporated.

Day, M. (1981). Thinking at Piaget's stage of formal operations. Educational Leadership, 39(1), 44-46.

Flores, M. (1995). The cognitive ability and learning style of students enrolled in home economics occupational courses in San Juan and Bayamon, Puerto Rico. Unpublished doctoral dissertation, The Ohio State University, Columbus.

Gall, M. (1970). The use of questions in teaching. Review of Educational Research, 40(5), 707-721.

Halpern, D. (1992). Sex differences in cognitive abilities (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

Harl, N. (1980). Toward excellence in teaching. NACTA Journal, 24(4), 5.

Lochhead, J., & Clement, J., Eds. (1979). Cognitive process instruction: Research on teaching thinking skills. Franklin Institute. (ERIC Document Reproduction Service No. ED 234 997).

Miller, C. (1989). Cognitive levels of instruction and student performance in college of agriculture courses. Unpublished doctoral dissertation, The Ohio State University, Columbus.

Miller, L., & Cano, J. (1986). Development of an exemplary program to deliver adult agricultural education. Unpublished manuscript, The Ohio State University, Columbus.

National Commission on Excellence in Education. (1983). A nation at risk: The imperative for educational reform. David P. Gardner (Chair). Washington, DC: United States Department of Education.

Nelson, R., & Scanlon, D. (1977). Parents' and students' perceptions of occupational survival skills. Vocational Guidance Quarterly, 25(3), 217-224.

Newcomb, L., & Trefz, M. (1987, February). Levels of cognition of student tests and assignments in the College of Agriculture at The Ohio State University. Proceedings of the Central Region 41st Annual Research Conference in Agricultural Education. Chicago.

Pascarella, E. (1985). College environmental influences on learning and cognitive development. In John C. Smart (Ed.), Higher Education: Handbook of Theory and Research. New York: Agathon Press, Incorporated.

Poulton, B. (1985). Reflection on a quality education. NACTA Journal, 29(3), 18-19.

Roberts, N. (1974). Further verification of Bloom's taxonomy. Journal of Experimental Education, 16-19.

Thorndike, E. (1931). Human learning. New York: Appleton-Century-Crofts.

Thurstone, L., & Thurstone, T. (1941). Factorial studies of intelligence. Chicago: University of Chicago Press.

Torres, R. (1999). Cognitive abilities of preservice teachers: A longitudinal study in agricultural education. Proceedings of the 26th annual National Agricultural Education Research Conference: Orlando, FL.

Torres, R. (1993). The cognitive ability and learning styles of students enrolled in the college of agriculture at The Ohio State University. Unpublished doctoral dissertation, The Ohio State University, Columbus.

Wick, J. (1990). Developing cognitive abilities test. Technical Manual (Reproduction edition). Chicago: American Testronics.

Cognitive Abilities of Oak Habor
High School Agricultural
Education Students

A Critique

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The authors are to be commended for conducting a study of this nature. The study has a strong theoretical base supported by a significant review of the literature. It would have been helpful to have a stronger connection drawn between the literature review and the purpose and objectives of the study. It appeared that the literature review stopped abruptly and then the purpose and objectives were presented. A rationale statement for conducting this particular study would have been appropriate to provide linkage. Also, it might be helpful to proofread the paper carefully since the name of the school was misspelled in the title. However, the study was well done and interesting to read. The researchers are commended for using an existing instrument in the study. The findings, conclusions and recommendations were linked to the literature. This linkage was well done. The paper does raise some questions that merit consideration:

- Why was this particular school chosen for this study? Is there something unique about this school?
- Who served on the panel of experts (types of people)?
- Where was this school located (urban, suburban, rural)?
- Can we conclude from recommendation #3 that up to this point this school has not used student attributes in planning and delivering instruction, or not used them to a great extent? Where to from here? What can we learn from this study?
- How do the implications differ from the recommendations?
- On a practical note, what does the school plan to do in concrete terms given this information? Are there plans to change? Specific examples might be helpful in assisting the school in the areas of critical thinking and spatial skills.

The authors are to be commended for conducting a study that provided data that could be of significant assistance to this particular school district. The researchers are encouraged to continue their work in the study of cognitive abilities.

DEVELOPMENT AND EVALUATION OF HANDS-ON LEARNING ACTIVITIES IN INDIANA HIGH SCHOOL ANIMAL SCIENCE CLASSES

Introduction

In 1991, the state of Indiana received funding to develop Agricultural Education curriculum guides for use by the Agricultural Science and Business teachers in the state. Currently, there are curriculum guides for eleven areas in secondary agriculture. Each curriculum guide contains objectives, lecture notes and information, suggested activities, and worksheets covering the curriculum area. One of the curriculum areas is Animal Science. The Animal Science curriculum guide was first developed in the fall of 1993 and revised in the summer of 1997.

A recent evaluation of the Animal Sciences curriculum guide (Berger & Russell, 1998) revealed that teachers felt there was a lack of hands-on and easy-to-do laboratory activities. Research has shown that hands-on techniques, also called experiential learning, enhances retention of the material by the students and increases student attitudes positively towards the material (Johnson et. al., 1997; Rothenberger & Stewart, 1995). In addition, experiential programs are more exciting to the students and are more rewarding to the faculty and administration that are involved with the program (Lempert, 1996).

Experiential learning is defined as an "intentional approach to learning, connecting the individual learner's experience to the knowledge being acquired and giving personal meaning to education" (Karls, 1999). Experiential learning refers to any learning activities that directly involve the learner in the subject being studied (Zurbrick, 1990). It is one of the main ideas of the century-old theory of progressive education (Hopkins, 1994).

John Dewey believed that there is a strong and essential relationship between actual experience and education (Dewey, 1938). He realized that experience was the organizing force for all learning and suggested that learning was most effective when self-directed and tied to theory and experience (Hoberman & Malick, 1994). Dewey classified types of knowing into two categories: experimental knowing and non-experimental knowing. Experimental knowing includes common sense investigations, experimental work in the sciences, and practical inquiries concerning what should be done. Non-experimental knowing includes perception and introspection which give people knowledge of present matters of fact, memory and historical research which give people knowledge of the past, and reasoning which gives people logical and mathematical knowledge (Dewey, 1977).

Wulff-Risner and Stewart (1997) reported that Kolb identified three characteristics of experiential learning. First, learning is best established as a process in which concepts are derived from and modified by experience. Second, learning is a continuous process grounded in experience. Third, the process of learning requires the resolution of conflicts between opposed modes of adaptation to the world.

Experiential learning programs differ greatly from conventional teaching methods. Experiential programs offer interest, connection, and purpose in the place of rote memorization, abstraction, and isolation (Hopkins, 1994). Experiential programs stimulate the students to think and act, they emphasize learning and activities that are relevant to life, and they recognize the students' need for intellectual and physical activity (Karlin & Berger, 1971). Compared to traditional programs, experiential learning programs are more effective, more exciting to the students, and more rewarding to the faculty and administration involved with the programs

(Lempert, 1996). Material learned by the experiential method is more easily retained (Coleman, 1976).

Kelley and Whatley (1980) determined student perceptions of experiential exercises. When the students felt comfortable with the instructor and perceived a positive teacher-student relationship, the students believed the experiential exercises were beneficial for understanding the topics covered, they felt more class time should be spent on experiential exercises, and experiential exercises made the topic interesting.

Experiential learning provides students with benefits. Experiential programs develop value-added traits in students by providing them with opportunities to learn how to learn, listen well, solve problems, and think creatively (Leske & Zilbert, 1989). Experiential programs focus on the concrete experiences to make learning easier. These programs are directed toward the cognitive abilities of the majority of students (Sakofs, 1995). Experiential learning programs provide students with skills such as teamwork and responsibility (Wingenbach, Gartin, & Lawrence, 1999). In experiential programs, the students are allowed to explore the subject matter for themselves (Chapman, McPhee, & Proudman, 1995) and they have the opportunity to learn more about themselves (Scarborough & Shinn, 1976). Experiential learning programs provide a direct link to future action (Coleman, 1976) and help the students answer the question, "What can you do?" (Lee, 1980).

Since their beginnings, agricultural education programs have been based in the experiential philosophy (Leske & Zilbert, 1989; Webb & Wardlow, 1994). Even the motto of the National FFA Organization, one of the three components of the agricultural education model, begins with the phrase "Learning to Do, Doing to Learn" (National FFA Organization, 2000). This demonstrates the significance agricultural education places upon experiential learning (Rothenberger & Stewart, 1995).

Experiential learning is one of the main components around which agricultural education curricula are focused (Martin & Peterson, 1991). Experiential learning fits into the agricultural education program because the content area is full of opportunities to provide students with direct experience and personal encounters that are meaningful and relevant (Osborne, 1994). Martin and Peterson (1991) believed "the supervision and evaluation of experiential learning and the eventual recognition of the students for excellence in experience makes this aspect of agricultural education critical to the mission of the program and a cornerstone to the curriculum" (p. 22). And, Osborne and Moss believed learning activities are "one of the best teaching techniques that agriculture teachers can use" (Osborne & Moss, 1993, p. 21).

A common experiential learning activity in agriculture is the laboratory method. The laboratory can be conducted in the classroom or indoor laboratory, or can be taken outside in the form of a school plot, field trip, farm shop, or practicum. Laboratory activities can help bridge the gap between the lecture material and real-life situations (Moles, 1988). Laboratory activities allow the students to practice skills under the supervision of the teacher (Stevens, 1967).

Previous studies have shown the benefits experiential learning activities can provide in agriculture-related content areas. Johnson et. al. (1997) studied the effect of hands-on activities versus worksheets in principles of physical science on student achievement and attitude. They found significant difference in student attitude toward the subject matter. Students were more positive toward the material when they had the opportunity to utilize hands-on activities as opposed to worksheets only.

Wingenbach et. al. (1999) sought to determine educational benefits, mathematics and science skills, life skills, and the future of aquaculture as perceived by agriculture students. The

researchers found that the respondents strongly believed in the aquaculture programs because of the hands-on learning provided by the programs. The students viewed the programs as exciting, challenging, and fun. The students believed it was important to be an active learner in this kind of program.

Purpose and Objectives

The purpose of this study was to measure the effectiveness of experiential learning of hands-on laboratory activities by Agricultural Science and Business students in Animal Sciences. The specific objectives of the study were to:

1. Develop and evaluate laboratory activities for the State approved Animal Science curriculum.

2. Determine the overall effectiveness of hands-on activities as reflected by student performance on a standardized assessment instrument.

The following null hypothesis was formulated:

H_o: There is no significant difference in student performance on the standardized test administered after the laboratory activity between students who participated in a complex laboratory activity and students who participated in a simple laboratory activity relying on traditional teacher-centered activities.

Procedures

This study was causal-comparative and utilized a purposive sample. Borg et. al. (1993) stated the causal-comparative method "enables researchers to explore cause-and-effect relationships between variables without carrying out an experiment...Two or more groups are formed on the basis of one variable" (p. 247). Borg et. al. (1993) defined a purposive sample as one in which the "researchers select a case, or cases, from which they can learn the most" (p. 101). Quantitative research methods were utilized to obtain data for analysis. Indiana Agricultural Science and Business teachers identified as leaders in Animal Science instruction were the target population for this study. Teacher Education faculty and state Agricultural Education staff identified teachers in the field proficient in teaching Animal Sciences. The teacher group consisted of Agricultural Science and Business teachers with a Bachelor's degree in Animal Science, a strong background in Animal Science, and/or several years of experience teaching Animal Science.

A letter was mailed to teachers at their school addresses in January, 1999. This letter explained the background and reasoning for the study and outlined the factors required for participating in the study. Teachers were then contacted in person, by telephone or by electronic mail, by the researcher to obtain participants for the study. A total of eight teachers were selected to participate in the study, with their students representing the unit for comparison.

Two laboratory activities were developed for this study in the areas of animal anatomy using a Foot Dissection laboratory, and a Genetic and Breeding laboratory. Ideas for these activities came from Purdue University Animal Science courses, Purdue University Animal Science professors, and the researcher, with the activities developed following the Indiana

Animal Science curriculum guide. Each of the laboratory activities was developed into a simple version, relying on teacher-centered activities, and a complex version, including student-centered activities, for a total of four different laboratory activities to be tested by the participating teachers. The complex versions contained more hands-on activities than the simple versions. Both the simple and complex versions of each laboratory activity contained a Teacher Guide, a Student Guide, a list of pertinent terms, anatomy diagrams when needed, and information sheets when needed. The researcher provided the major supplies needed to conduct the laboratory activities.

The instrument used to collect data in this study was a standardized test given to the Agricultural Science and Business students after they participated in the laboratory activities. The instrument was developed by the researcher following the objectives of each laboratory activity. A panel of experts reviewed the instrument for face and content validity. Each test contained five multiple-choice items and five true and false items. An additional section consisted of diagram labeling, matching, problem solving, or fill-in-the-blank, depending on the nature of the laboratory activity for which the test was written. The Foot Dissection, and Genetics and Breeding tests contained 20 items. The same test was used for the students who participated in the complex and simple laboratory activities.

Each teacher tested the laboratory activities in his or her classroom. The laboratory activities were assigned to the participating teachers utilizing a random number table. Once the laboratory activities were designed, all components were compiled into a kit form. A letter to the teachers with directions was also included in each kit. Student tests from all participating teachers were returned to, or picked up by, the researcher between March and May 1999. For consistency, the researcher graded all student tests using a key that was established when the tests were written.

The data were analyzed using Statistical Package for the Social Sciences (SPSS Version 9.0 for Windows). The data were organized, summarized, and analyzed using descriptive statistics, including frequencies, means, and standard deviations. Each question for all four student tests was analyzed to obtain the frequencies of correct and incorrect responses. Significant differences between student responses and laboratory activity version were assessed using an independent sample t-test between the means. The independent sample t-test procedure compares the means for two groups of cases (SPSS for Windows, 1998). The overall means and standard deviations for the simple version test group and complex version test group were calculated and compared. To control for the equality of variance between the control and treatment groups, Levene's test for equality of variance was used. When the p-value for Levene's test was <0.05, the two-tailed significance was calculated on unequal variance between the two groups.

Results

Results in the form of total test scores were used to compare students in the simple laboratory version with students in the complex laboratory version. The student test for the Foot Dissection laboratory consisted of 20 questions, each worth one point. The questions were multiple-choice, true-false, and labeling. The simple version had a group mean of 8.33 correct responses with a standard deviation of 2.94. The range of student scores was from a minimum of three to a maximum of 13. The complex version had a group mean of 11.66 correct responses with a standard deviation of 3.56. The range of student scores was from a minimum of four to a

maximum of 19. The data from the student tests support the rejection of the null hypothesis H_o at the 0.05 level for the Foot Dissection unit. Table 1 illustrates the overall student test scores on the Foot Dissection test.

Table 1
Overall Student Test Scores on Foot Dissection Test (n=56)

Item	Simple		Complex		p-value
	Mean	Std. Dev.	Mean	Std. Dev.	
Overall Score	8.33	2.94	11.66	3.56	0.000

Significance for each question of the test was obtained by keying the answers 1 = Correct Answer and 2 = Incorrect Answer and calculating a p-value using t-test analysis. Nine of the 20 items on the Foot Dissection test showed a significant difference at the 0.05 level between the simple and complex groups. These items were question 3, question 6 and question 10, and Labeling questions 1A, 2, 2A, 3, 3A, and 5A. Table 2 illustrates the percentage of correct responses and p-values for each question used in the Foot Dissection test.

The student test for the Genetics and Breeding laboratory consisted of 20 questions, each worth one point. The questions were multiple choice, true-false, constructing a Punnett square, identifying genotype and phenotype from the Punnett square, and short answer. The simple version had a group mean of 11.08 correct

Table 2
Percentages of Correct Responses and p-values on Foot Dissection Test Items (n = 27 students for simple laboratory activity, n = 29 students for complex laboratory activity)

Item	Percentage of Students That Responded Correctly		
	Simple	Complex	p-value
1. The beef feet used in the lab were cut off at the metacarpals or metatarsals. Where are the metacarpals and metatarsals in the human body?	81.5	86.2	0.638
2. When the _____ was cut and pressure was applied at the top of the leg, the angle of the pastern became more horizontal.	55.6	48.3	0.594
3. Humans differ from animals in the number of metacarpals and metatarsals found in the limbs. How do humans compare to pigs in number or metacarpals/metatarsals?	18.5	62.1	0.001*
4. Cattle have 2 fused metacarpals and metatarsals. What are the numbers of the bones that are fused?	66.7	62.1	0.726
5. How many sets of phalanges do cattle have on each leg?	63.0	69.0	0.643
6. The actions of extensor tendons cause joints and limbs to flex.	14.8	62.1	0.000*

(table continues)

Table 2 *(continued)*

Item	Percentage of Students That Responded Correctly		
	Simple		Simple
7. Cows and sheep have the same number of metacarpals and metatarsals.	81.5	82.8	0.903
8. A superficial tendon is further away from the skin surface.	81.5	65.5	0.181
9. A digital flexor tendon is responsible for the movement of the digits or toes.	88.9	82.8	0.521
10. Sesamoid bones are small bones that function in the absorption of concussion.	70.4	24.1	0.000*
11. Labeling – Common digital extensor	29.6	34.5	0.704
12. Function – extends digit	14.8	41.4	0.027*
13. Labeling – Superficial digital flexor	14.8	37.9	0.050*
14. Function – flexes digit	7.4	41.4	0.003*
15. Labeling – Deep digital flexor	14.8	44.8	0.013*
16. Function – flexes digit	7.4	34.5	0.012*
17. Labeling – Lateral digital extensor	18.5	27.6	0.431
18. Function – extends digit	11.1	24.1	0.206
19. Labeling – P3, coffin bone	55.6	79.3	0.061
20. Function – balance, support	40.7	79.3	0.003*

* indicates significance at the 0.05 level

responses with a standard deviation of 3.12. The range of student scores was from a minimum of seven to a maximum of 20. The complex version had a group mean of 8.43 correct responses with a standard deviation of 3.96. The range of student scores was from a minimum of one to a maximum of 19. The data from the student tests support the rejection of the null hypothesis H_o at the 0.05 level for the Genetics and Breeding unit in this case, however, with the simple version of the activities having statistically significant higher scores than the complex version. Table 3 illustrates the overall student test scores on the Genetics and Breeding test.

Table 3
Overall Student Test Scores on Genetics and Breeding Test

Item	Simple		Complex		p-value
	Mean	Std. Dev.	Mean	Std. Dev.	
Overall Score	11.08	3.12	8.43	3.96	0.005

Significance for each of the test questions was obtained by keying the answers 1 = Correct Answer and 2 = Incorrect Answer and calculating a p-value using t-test analysis. Table 4 illustrates the percentage of correct responses and p-values for each question used in the Genetics and Breeding test.

Table 4

Percentages of Correct Responses and p-values on Genetics and Breeding Test Items (n = 25 students for simple lab. activity, n = 49 students for complex lab. activity)

Item	Percentage of Students That Responded Correctly		
	Simple	Complex	p-value
1. A monohybrid cross between two individualsheterozygous for the trait will yield which of the following in the offspring?	64.0	63.3	0.951
2. What equation is used to determine percent sureness of the sire being homozygous in a test cross?	84.0	73.5	0.289
3. A dihybrid cross between two individuals heterozygous for both traits will yield what phenotypic ratio?	92.0	65.3	0.003*
4. From the example given by your teacher on coat color in dogs, what were the four possible coat colors? (assuming no other genes that control coat color are active)	88.0	67.3	0.033*
5. A cat's genetic makeup is rr and he has curly hair. Which of the following is NOT true about the cat?	60.0	55.1	0.692
6. A cross between a homozygous dominant individual and a homozygous recessive individual will yield offspring with dominant phenotypes and heterozygous genotypes.	80.0	65.3	0.174
7. In a test cross, if all the offspring exhibit the dominant phenotype, one can be 100% sure that the sire is homozygous for the trait.	56.0	46.9	0.468
8. The phenotype of an individual is the genetic makeup of that individual.	68.0	57.1	0.372
9. Another name for a heterozygous individual is a carrier	64.0	49.0	0.223
10. Crossing two individuals that are homozygous recessive can yield offspring that exhibit the dominant phenotype.	72.0	69.4	0.819
11. Construction of Punnett Square	84.0	83.7	0.972
12. Genotype 1	36.0	18.4	0.126
13. Genotype 2	24.0	10.2	0.432
14. Genotype 3	20.0	10.2	0.297
15. Genotype 4	20.0	8.2	0.200
16. Phenotype 1	44.0	26.5	0.152
17. Phenotype 2	40.0	16.3	0.043*
18. Phenotype 3	24.0	6.1	0.066
19. Phenotype 4	24.0	6.1	0.066
20. Homozygosity/heterozygosity determination	64.0	36.7	0.026*

* indicates significance at the 0.05 level

Four of the 20 items on the Genetics and Breeding test showed a significant difference at the 0.05 level between the simple and complex groups. These items were questions 3 and 4, Phenotype 2, and the question where the students were asked to determine homozygosity or heterozygosity.

Conclusions and Recommendations

Foot Dissection Activity

Four teachers and 56 students participated in the Foot Dissection activity. Student data from the activity supported the rejection of the null hypothesis H_o at the 0.05 level. Nine of the 20 items on the Foot Dissection test showed a significant difference at the 0.05 level between the simple and complex groups. Students that participated in the complex group had a higher overall mean than did students that participated in the simple group. The benefits of experiential learning are evident in the results from the Foot Dissection activity. Experiential learning can provide many benefits to students, including increased student achievement concerning the material. This finding concurs with Johnson et. al., (1997) and Rothenberger & Stewart (1995). Of the four activities used in this study, the Foot Dissection activity supported the rejection of the null hypothesis H_o in addition to yielding a higher overall test mean for the complex group. This activity showed the greatest difference between the simple and complex versions due to the nature of the activity. In the simple version, the teacher performed the dissection and the students observed. In the complex version, the students were split into groups and performed the dissection themselves with limited direct instruction from the instructor.

Hands-on activities enable students to learn complex concepts such as anatomy and physiology better than teacher-centered activities. The students that dissected the legs themselves were able to observe the anatomy of the lower leg and performed better on an evaluation of the material, exhibiting better recall of the tendons and their functions. This same idea can be applied to help students learn about other areas of animal anatomy, including circulation, digestion, and reproduction. Therefore, it is recommended that teachers provide hands-on activities during anatomy and physiology lessons in which the students perform the activity themselves and the teacher provides limited direct instruction.

Genetics and Breeding Activity

Four teachers and 74 students participated in the Genetics and Breeding activity. Student data from the activity supported the rejection of the null hypothesis H_o at the 0.05 level. Four of the 20 items on the Genetics and Breeding test showed a significant difference at the 0.05 level between the simple and complex groups. Students that participated in the simple group had a higher overall mean than did students that participated in the complex group.

In the group of student tests from a particular teacher's program, the students wrote comments beside some of the questions indicating the teacher had not covered the material. This teacher had a student teacher in his program at that time, and the student teacher conducted the laboratory activities. The possibility that a student teacher may deliver the instructional material was never considered during the design phase of this experiment. Although experiential learning can provide many benefits to students, including increased interest and enthusiasm toward the material, the results form the Genetic and Breeding activity show inconclusive results to support that phenomenon.

The high performance of the students that participated in the simple version of the activity implies that there may have been confounding variables that were not accounted for in the design of the study. One of the two teachers that was allocated the simple version of the activity had previously covered genetics in his animal science class, so participating in this activity served as a review for his students. One of the two teachers that was allocated the complex version of the activity had a student teacher in his program at the time of the study and instructed the student teacher to conduct the activities. In the group of student tests from this teacher, the students wrote comments beside some of the questions indicating the teacher had not covered the material. In the survey, this student teacher indicated some confusion on her part toward the activity. This is understandable considering the student teacher was removed from the direct instruction given by the researcher at the time the laboratory activities were delivered.

When testing new curriculum or materials, researchers often utilize teachers and their students. Teachers can often provide valuable feedback and information that can help researchers improve curriculum design practices. It is recommended that researchers utilize teachers with experience rather than student teachers. Student teachers are still students themselves and, in most cases, do not have the ability to properly teach and evaluate experimental curricula.

Hands-on activities can yield higher levels of understanding of the material by the students. The Animal Science curriculum has the potential for the use of many different hands-on activities. Therefore, it is recommended that a variety of hands-on, student-centered activities be included in agricultural education Animal Science curriculum.

Recommendations

Many confounding variables that had an effect on the results were associated with this study. These variables were unexpected and not previously accounted for by the researcher. In educational research that utilizes experimental curriculum and teachers in the classroom, researchers need to make sure that the parameters of the study are made clear to the participating teachers, and that the teachers then adhere to the parameters. Student teachers should not be used and participating teachers should give careful attention to the instruction of the activities. Teachers' background knowledge with the material they are to be evaluating should also be considered. Therefore, it is recommended that researchers attempt to account for as many confounding variables as best as possible.

This type of study is not limited to the area of animal science. The same research can be conducted in the other curriculum areas in agricultural education. All curriculum areas of agricultural education provide the opportunity of the inclusion of hands-on learning activities. Therefore, it is recommended that other areas of agricultural education be investigated with regards to the benefits of hands-on learning.

References

Berger, C. A. & Russell, M. A. (1998). Special problems in animal science educational programs. Presentation to the Indiana Vocational Agricultural Teachers Association, June 1998.

Borg, W. R., Gall, J. P., & Gall, M. D. (1993). Applying Educational Research. White Plains, NY: Longman.

Chapman, S., McPhee, P., & Proudman, B. (1995). What is experiential education? In K. Warren, M. Sakofs, & J. Hunt, Jr. (Eds.), The theory of experiential education (pp. 236-247). Dubuque, IA: Kendall/Hunt Publishing Co.

Coleman, J. S. (1976). Differences between experiential and classroom learning. In M. T. Keeton and Associates, Experiential Learning (pp. 49-61). San Francisco: Jossey-Bass Publishers.

Dewey, J. (1938). Experience and education. New York: The MacMillan Company.

Dewey, R. E. (1977). The philosophy of John Dewey. The Hague, Netherlands: Martinus Nijhoff.

Hopkins, R. L. (1994). Narrative schooling. New York: Teachers College Press.

Johnson, D. M., Wardlow, G. W., & Franklin, T. D. (1997). Hands-on activities versus worksheets in reinforcing physical science principles: Effects on student achievement and attitude. Journal of Agricultural Education, 38 (3), pp. 9-17.

Karlin, M. S. & Berger, R. (1971). Experiential Learning. West Nyack, NY: Parker Publishing Co., Inc.

Karls, M. (1999). Experiential Learning: theory and practice. [Online], Available: http://userwww.sfsu.edu/~myellak/xed/main.html

Kelley, L. & Whatley, A. (1980). The teacher-student relationship in experiential classes and the student's perception of course effectiveness. Journal of Experiential Learning and Simulation, 2 (1), pp. 9-16.

Lee, J. S. (1980). Experiential programs can help answer the big question. The Agricultural Education Magazine, 52 (11), pp.3-4.

Lempert, D. H. (1996). Escape from the ivory tower. San Francisco: Jossey-Bass Publishers.

Leske, G., & Zilbert, E. (1989). Maximizing experiential learning: Key to value added education. The Agricultural Education Magazine, 62 (1), pp. 10, 16.

Martin, R. A., & Peterson, R. L. (1991). Knowledge base and content of agricultural education. The Agricultural Education Magazine, 63 (8), pp. 21-22.

Moles, J. A. (1988). The classroom and the field: a necessary unity. Journal of Experiential Education, 11 (2), pp. 14-20.

National FFA Organization. (2000). About FFF: FFA Basics. [Online], Available: http://www.ffa.org/about_ffa/index.html

Osborne, E., & Moss, J. (1993) Biological Science Applications in Agriculture: Animal Science. Urbana-Champaign, IL: University of Illinois.

Osborne, E. (1994). Completing the cycle. The Agricultural Education Magazine, 67 (3), pp. 3, 11.

Rothenberger, B. H., & Stewart, B. R. (1995). A greenhouse laboratory experience: Effects on student knowledge and attitude. Journal of Agricultural Education, 36 (1), pp. 24-30.

Sakofs, M. (1995). Piaget – A psychological rationale for experiential education. In K. Warren, M. Sakofs, & J. Hunt, Jr. (Eds.), The theory of experiential education (pp. 149-151). Dubuque, IA: Kendall/Hunt Publishing Co.

Scarborough, C., & Shinn, G. (1976). Learning to do, doing to learn. Agricultural Education, 49 (5), pp. 104-105, 114.

SPSS for Windows [Computer Software]. (1998). Chicago, IL: SPSS, Inc.

Stevens, G. Z. (1967). Agricultural Education. New York: The Center for Applied Research in Education, Inc.

Webb, D., & Wardlow, G. (1994). FFA dairy and livestock judging as experiential education laboratories. The Agricultural Education Magazine, 67 (3), p. 17.

Wingenbach, G. J., Gartin, S. A., & Lawrence, L. D. (1999). Students' perceptions of aquaculture education in the northeast region. Journal of Agricultural Education, 40 (1), pp. 14-22.

Wulff-Risner, L., & Stewart, B. (1997). Using experiential learning to teach evaluation skills. Journal of Agricultural Education, 38 (3), pp. 43-50.

Zurbrick, P. R. (1990). Experiential education. The Agricultural Education Magazine, 62 (12), p. 3.

Development and Evaluation of Hands-On
Learning Activities in Indiana High School
Animal science Classes

A Critique

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Experiential learning represents an important area of research for agricultural educators. The authors are to be commended for conducting a study that focused on one of the key areas of interest to the profession. The approach the authors took in studying experiential learning was interesting and informative.

The theoretical foundation for the study as represented in the literature review was sound and very well written. It would have been helpful to have a smoother transition from the introduction/theoretical framework to the purpose and objectives of the study. I believe the procedures used in the study were appropriate and they were fully explained. However, that was clearly not the case in which one teacher turned over the activity to a student teacher not trained to deliver the program. This somewhat compromised the study. Also, carefully proofreading the paper would have helped alleviate errors in two tables and the presentation of the data in them.

The paper does raise some questions that merit discussion:

- Given the nature of experiential learning, in its purest form, it seems odd to test its impact using a standardized test. Isn't the idea of experiential learning to create meaning for individual learning, knowing that "meaning" may be different for different learners? How does a standardized test do justice to this ideal? Was the exercise truly experiential or merely guided experience with a memorization goal?
- Who made up the panel of experts to review the instrument (teachers, animal scientists etc)?
- Some educators may be curious why a foot dissection laboratory would be appropriate for high school agriculture students. Are these agriculture students typical high school students in typical agriculture programs? It appears these programs are specialized in animal science, but even then it seems this knowledge is beyond high school level.
- Is a hands-on activity or student-centered activity equivalent to experiential learning?
- The paper had two sections referring to recommendations. Why? Why not use the last section of the paper for implications of the study since that was the essence of what was presented?
- In spite of the variables you mention, could it be that the Genetics and Breeding Activity is best learned by using teacher-centered activities? Hands-on learning may not work best all the time.

TEACHING BIOLOGY USING AGRICULTURE AS THE CONTEXT: PERCEPTIONS OF HIGH SCHOOL STUDENTS

Introduction

Agricultural Education teachers have recently been encouraged to work at establishing methods for integrating more scientific principles into their agriculture curriculum. The concept of integrating science into agricultural education programs has been supported from various sources for almost two decades (A Nation at Risk, 1983; Understanding Agriculture: New Directions for Education, 1988; Secretary's Commission on Achieving Necessary Skills, 1991).

Research findings have supported the claim that integration of science into agriculture curricula is a more effective way to teach science. Studies conducted and duplicated support the findings that students taught by integrating agricultural and scientific principles demonstrated higher achievement than did students taught by traditional approaches (Enderlin & Osborne, 1992; Enderlin, Petrea, & Osborne, 1993; Roegge & Russell, 1990; and Whent & Leising, 1988). And, Osborne and Dyer (1998) discovered that "as a result curriculum redesign efforts in the 1990's in agricultural education have converged on identifying promising strategies that incorporate more science into high school agricultural curricula" (p. 8).

According to Science for All Americans (1989), a science literate person is one who 1) is familiar with the natural world, 2) understands the key concepts and principles of science, mathematics, and technology, 3) has a capacity for scientific ways of thinking, 4) is aware of some of the important ways in which mathematics, technology, and science depend upon one another, 5) knows that science, mathematics, and technology are human enterprises, and what that implies about their strengths and limitations, and 6) is able to use scientific knowledge and ways of thinking for personal and social purposes.

A contextual approach to scientific thinking is embedded in each of the above statements. To improve science literacy and students' understanding about the nature of science students must be challenged to think about science as something more than just sitting in the traditional science classroom. They need exposure to multiple opportunities for thinking scientifically, and multiple opportunities for applying scientific reasoning to everyday, complex problems.

Helping students understand the nature of science rather than what they know *about* science has been a recent focus of research in science. Devlin (1998) states "it is neither possible nor necessary for the general population to have detailed scientific knowledge across a range of disciplines. Instead, what is important is scientific awareness" (p. B6). By approaching students with diverse interests in various disciplines with curriculum that supports formal science education, science could be relevant to those who are disengaged with traditional approaches to teaching science. The recently released report to Americans by the National Commission on Mathematics and Science Teaching for the 21st Century, referred to as the Glenn Commission, calls student performance in mathematics and science unacceptable (National Commission on Mathematics and Science, 2000).

And, although recent science publications have espoused the attributes of integrating the science curricula, the level of integration referred to is almost always with *other* science courses

(Scotter, Bybee & Dougherty, 2000; Steckelberg, et. al., 2000; Henriques, 2000). Limited evidence exists to support the concept that science teachers should look for ways to integrate more hands-on, applied science concepts into the science curricula. To date, the researcher could find no empirical evidence to suggest that science teachers have been advised to integrate agricultural science and/or food system concepts into their curricula in an attempt to make science come alive to their students. Likewise, no information could be found advising science teachers to initiate contact with other teachers in an effort to collaborate with teachers of similar content.

The experiential learning model provides the theoretical basis for this project. According to Dewey (1938), education was not a single step in a moment of time but rather a series of overlapping events that served to help the learner construct meaning in much more than just the subject matter being presented. Dewey (1938) wrote:

> "Perhaps the greatest of all pedagogical fallacies is the notion that a person learns only the particular thing he is studying at the time. Collateral learning in the way of formation of enduring attitudes, of likes and dislikes, may be and often is much more important...For these attitudes are fundamentally what count in the future. The most important attitude that can be formed is that of desire to go on learning. If impetus in this direction is weakened instead of being intensified, something much more than mere lack of preparation takes place". (p. 49-50)

Further evidence for providing students with multiple contexts is found in brain-based research and learning by Caine and Caine (1994) who call for education to recognize the big picture. They add "the part is always embedded in a whole, the fact is always embedded in multiple contexts, and a subject is always related to many other issues and subjects" (p. 7). Therefore, brain-based theory and the experiential learning theory suggest that the interface between context and content provide students with multiple opportunities for transfer and overlap of complimentary concepts.

In 1993, a biology teacher in a large high school in the Midwest began teaching a traditional biology course using agricultural science as the context for scientific principles. The biology teacher's training includes a Bachelor of Science in Agricultural Education in 1965. However, the teacher did not enter the Agricultural Science and Business teaching field, but opted to teach traditional science for the past 31 years instead. The motivation for teaching biology using a year-long thematic approach centered around the teacher's desire to expose his students to concepts of where their food originates. No classes in Agricultural Science and Business are taught in this high school.

The teacher created a series of instructional units, field trips, laboratory activities, and guest speakers focused on a specific farm animal for each year. Alternating between poultry, swine, and dairy cows, the teacher taught traditional biology using the animal agriculture context for six years. Many of the students who live in the 60,000+ community had never experienced, first-hand, animal agriculture and never considered the scientific understanding necessary to be involved in animal agriculture.

Purpose and Objectives

The purpose of this study was to determine how high school students perceived science and agriculture after completing a traditional yearlong biology class that used agricultural science as the context. Specifically, what were student perceptions of the relationship between science and animal agriculture, what were student perceptions of animal agriculture in general, and what level of knowledge about agriculture was retained by students after completing the biology class? Finally, what were specific demographic variables of students completing the biology class in a medium-sized Midwest town? To fulfill the purposes of the study, the following research questions were addressed:

1. What were selected demographic variables of completers of a traditional biology class that was taught using animal agriculture as the context?

2. What were perceptions of completers of a traditional biology class that was taught using animal agriculture as the context, concerning the relationship between science and agriculture?

3. What were the perceptions of completers of a traditional biology class that was taught using animal agriculture as the context, concerning animal agriculture in general?

4. What level of knowledge about agriculture did students of a traditional biology class retain after completing the course one to six years earlier?

Procedures

The target population for this study consisted of the completers of a traditional high school biology class that used agricultural science as the context for teaching science. The high school involved in this study has a population of over 2,000 students and does not offer Agricultural Science and Business courses. The target population for the study included all students who participated in the biology course from the time agriculture science was used as the context for teaching biology, from 1993 until 1999 (N=531). The biology teacher provided the researcher with a database containing the names and home addresses of all students. Caution should be exercised when generalizing the results of the study beyond the accessible sample.

A survey instrument developed by the researcher was used to identify the perceptions of the completers of the biology course. Input on face and content validity was gathered from agricultural education professors and input on construct validity was obtained from the high school teacher involved in teaching the biology course. As a measure of the reliability of the attitude scale, internal consistency was established using Cronbach's alpha ($\alpha = .77$). The survey instrument was developed in conjunction with guidelines provided by the Institutional Review Board for governing research conducted using human subjects by the institution employing the researcher. Permission to gather data from students and past high school graduates was granted by the administration of the high school as well.

The survey instrument, cover letter, and parent release form were mailed to the home of the subjects in June 2000. Subjects were instructed to return the survey instrument by mail to the high school office, or to hand carry the instrument and deliver it to the main office of the high

school. Two weeks after the initial mailing, a follow-up letter was sent to all non-respondents. Four weeks after the initial mailing a second survey instrument and cover letter was sent to all subjects who had not responded, with a follow-up reminder letter coming 2 weeks after that. The population included students who had taken the biology course up to six years prior to the study. As a result, some addresses for students were not current and survey packets were returned to the researcher undeliverable as indicated by the post office. After subtracting 75 subjects who were unable to be contacted, the researcher received 311 useable responses for a response rate of 68%.

Results

Students who participated in the biology class that was taught using agriculture as the context were exposed to one of three different yearlong themes. During the school years of 1993-94 and 1996-97 biology students were taught with the theme "Swine Time", an emphasis on the nature of swine. During the school years of 1994-95 and 1997-98 students were taught with an emphasis on dairy animals called "Dairy Daze". And, in 1995-96 and 1998-99 students received instruction centered on poultry in a thematic approach called "Poultry Power". In each theme throughout each school year, students were exposed to traditional biology principles through an animal agriculture reference.

Student responding to the study reported 30.2% had experienced Dairy Daze, 28.2% had experienced Swine Time, and the remaining 41.6% had been exposed to the Poultry Power theme. Of the students reporting, 97.7% were high school freshman participating in their first high school science class. When asked about the grade they received in the class 40.0% reported receiving an "A", while 41.0% reported receiving a grade of "B". The mean overall high school Grade Point Average of the respondents was 3.46 (out of a possible 4.00 Grade Index). Approximately 60% were females, and over nine out of 10 reported they were Caucasian. When asked for background information that might connect them to agriculture, less than three percent indicated they lived on a farm, and 18% reported they had been in 4-H. Table 1 highlights additional demographic information on the respondents.

The subjects were asked to respond to 36 statements regarding their perceptions of science, their perceptions of agriculture, and their knowledge of agriculture as a result of taking the modified biology class. Their responses were measured using a five point Likert-type scale where 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, and 5=strongly agree. Cronbach's Alpha for reliability was .77.

The raw mean scores for the statements regarding the respondents' perceptions of science and/or agriculture ranged from a low of 1.67, indicating their disagreement, for the statement "animals should not be used for meat" to a high score of 4.36 for the statement "I understand the need for people involved in animal agriculture to have a strong science background". Overall, biology students in the modified biology class rated 56% of the statements with a 4.00 or greater on a 5 point Likert-type scale indicating they "agreed" or "strongly agreed" with the statement. Nineteen percent of the statements were rated below 3.00 on the five-point scale indicating respondents disagreed with the statement, with some former respondents strongly disagreeing. The remaining 25% of the statements were rated with scores between 3.00 and 4.00 indicating respondents were neutral or somewhat in agreement with the contents of the statement.
Table 1

Descriptive Statistics for Selected Demographic Characteristics of Students Enrolled in a Traditional Biology Class Taught Using Agriculture as the Context (N=311)

Characteristic		Percentage
Grade received for Biology class using agriculture as the context:	A	40.0
	B	41.0
	C	3.5
	D	2.3
	Unsure	13.2
Gender:	Female	58.9
	Male	41.1
Ethnicity:	African American	2.6
	American Indian	0.6
	Asian American	2.3
	Caucasian	92.9
	Hispanic	0.6
	Multiracial	1.0
Location of Residence:	Farm	2.6
	Rural Area	27.2
	Urban/City	70.1
Member of 4-H:	Yes	17.5
	No	82.5
Relatives that live/work on a farm:	Yes	37.4
	No	62.6
Grades received in all science classes:	All A's	25.6
	A's and B's	64.7
	B's and C's	9.1
	C's and D's	0.6
As a result of taking a biology class using agriculture as the context my *interest* in food systems and agriculture is:	High	5.2
	Moderately High	23.3
	Moderate	51.1
	Moderately Low	12.0
	Low	8.4

Research question two asked former students of the biology class, modified by using agriculture as the context, their perceptions concerning the relationship between science and agriculture. Table 2 shows the results from six questions used to determine respondent attitudes towards this concept. Using the same Likert-type scale, scores in this section ranged from 4.20

to 4.36, indicating the respondents agreed or strongly agreed with each question concerning the relationship between science and agriculture.

Table 2
Perceptions of High School Students Regarding the Relationship Between Science and Agriculture After Taking a Biology Course Using Agriculture As the Context (N = 311)

Item Statement	Mean	SD
As a result of taking a biology course that emphasized animal agriculture I:		
Understand the need for people involved in animal agriculture to have a strong science background.	4.36	0.78
Understand the relationship of science with agriculture more than I did before.	4.35	0.77
Appreciate those who work in agriculture more than I did before.	4.34	0.82
Understand the practices of animal agriculture more than I did before.	4.30	0.87
Appreciate the importance of agriculture more than I did before.	4.20	0.85
Appreciate the complex nature of animal agriculture more than I did before.	4.20	0.78

Research question three asked former students about their perceptions concerning agriculture in general. There were 10 questions in this section. Table 3 shows the results from the questions used to determine respondent attitudes towards this concept. Scores in this section ranged from 1.67 to 4.31. Respondents indicated they either agreed or strongly agreed with the statement "people who raise animals for food need to know a great deal about science in order to do their job effectively" (4.31). Table 3 highlights the results from 10 questions used to determine respondent attitudes towards this concept.

Research question four asked students who were taught biology using an agricultural thematic approach about their knowledge of specific agriculture as a result of attending a modified biology course. Six statements were included in this section which referenced material covered during the yearlong biology class. Students were asked general agriculture and general animal science questions that were part of the instruction offered to each biology class regardless of the animal species used for the particular year. Questions utilized a multiple-choice format, and answers were coded as either correct or incorrect for tabulation purposes. No attempt was made to categorize incorrect answers or to draw conclusions from the results of incorrect responses. The correct answers given to the six questions ranged from 92% of the respondents correctly identifying the role of vaccines in animal health to a low response of seven percent for correctly identifying the approximate percentage of disposable income American's spend on

food each year. Table 4 gives detailed information concerning the responses of students to the questions in this category.

Table 3
Perceptions of High School Students Toward Agriculture in General After Taking a Biology Course Using Agriculture As the Context (N = 311)

Item Statement	Mean	SD
People who raise animals for food need to know a great deal about science in order to do their job effectively.	4.31	0.83
Farmers care about their animals.	4.07	0.79
Raising animals for food and/or being a farmer is a noble profession.	4.07	0.83
All students should have knowledge about food systems and animal agriculture.	3.88	0.84
Animal agriculture and food production is all about science.	3.75	0.87
Exciting careers exist in agriculture.	3.67	0.89
Generally speaking, farming is a lucrative occupation.	2.93	0.97
Farmers do not treat their animals humanely.	2.05	0.90
Farmers raising animals are not concerned with the environment.	1.75	0.91
Animals should not be used for meat.	1.67	0.91

Table 4
High School Students' Knowledge of Agriculture After Taking a Biology Course Using Agriculture As the Context (N = 311)

Item Question		Percentage
Animals can be made artificially immune to certain diseases with the use of which of the following?	Correct	91.8
	Incorrect	8.2
_____ is sometimes placed in animal feeds to fight bacteria?	Correct	77.6
	Incorrect	22.4
_____ is the number one livestock industry in the United States?	Correct	54.4
	Incorrect	45.6

Table 4 (cont.)
High School Students' Knowledge of Agriculture After Taking a Biology Course Using Agriculture As the Context (N = 311)

Item Question		Percentage
What is an advantage to crossing two purebred animals in order to obtain a crossbred?	Correct	47.8
	Incorrect	52.2
Approximately what percentage of all jobs in the United States are related to the food and fiber system?	Correct	24.4
	Incorrect	74.6
Approximately what percentage of disposable income is spent on food in the United States?	Correct	6.7
	Incorrect	93.3

Conclusions

The conclusions of this study were based on the responses of students enrolled in a traditional biology course that was taught using agriculture as the context for. Students who were enrolled in the course were taught one of three yearlong units specializing in animal agriculture. Although other studies focus on the impact of using agriculture to teach science, caution must be exercised when generalizing the results beyond the population of the study.

From the data it was concluded that the majority of the respondents did well in the biology class, receiving either an "A" or "B" for the course. In general, over 90% of the students reported receiving either "A's and B's" in all of their science courses. By evidence of their relatively high Grade Index (3.46 out of a possible 4.00) it can be concluded that the respondents took their science classes and their schoolwork seriously. Based on the responses of the subjects to questions regarding previous involvement with agriculture and/or involvement in agricultural youth organizations such as 4-H, no evidence appeared to indicate they were predisposed to a sympathetic viewpoint toward agriculture. Over 70% reported living in an urban or city setting, over 65% did not have a relative who lived or worked on a farm and four out of five were never involved in 4-H. Furthermore, no classes in Agricultural Science and Business were offered anywhere in the city's consolidated school corporation indicating there was no chance to be involved in the National FFA Organization as well. However, as a result of receiving instruction in biology using agriculture as the context, 80% of respondents indicated they now have a moderate to high level of interest in food systems and animal agriculture as a result of taking this class. It can be concluded that although the Agricultural Education model was not implemented for teaching agriculture in this high school, the students did receive some benefit of agricultural instruction from this biology class in the form of increased agricultural awareness.

Research question two sought to determine the perceptions of respondents toward the relationship between science and agriculture. Based upon a Likert-type scale, over 90% of the subjects reported that they either agreed or strongly agreed that participating in a biology class that used agriculture as the context helped them understand the relationship between science and agriculture. This concurs with the findings of Caine and Caine and supports the work being done

in brain-based theory. Over 85% of those responding agreed or strongly agreed that they not only appreciated the complex nature of animal agriculture as a result of taking the agricultural based biology class, but the biology class also helped them understand the practices used in animal agriculture. It can be concluded that students gained an understanding of the role science plays in the world of agriculture as a result of taking a biology course taught using an agricultural context.

Almost nine out of ten (88.6%) agreed or strongly agreed that they appreciated the importance of agriculture and appreciated those who work in agriculture as a result of participating in an agricultural based biology class. This response indicates that the teacher was successful in communicating the importance of science in the world of agriculture. As a result of taking the biology class using agriculture as the context, respondents indicated that they understood the need for farmers to have a strong science background. It can be concluded that this biology course helped dispel the myth that farmers are not educated and that farming doesn't require a sophisticated education.

Research question three looked to determine the perceptions of the respondents toward animal agriculture in general. Almost 90% (86% and 87% respectively) disagreed or strongly disagreed with statements that animals should not be used for meat and that farmers raising animals are not concerned with the environment. Conversely, respondents felt very strongly about the people raising animals for human consumption. Four out of five (78%) strongly agreed or agreed that farmers care about their animals. Over 80% strongly agreed or agreed that raising animals for food and/or being a farmer is a noble profession. This indicates a positive perception and attitude toward the people involved in animal agriculture. It can be concluded that students of the modified biology class realize the need for animal agriculture and feel that farmers treat their animals humanely. Since a large majority of the respondents reported living in an urban or city setting with no exposure to animal agricultural production, many have positive perceptions about farmers and farming, with some maintaining these attitudes for over five years. It can be concluded that subject matter taught in the context of agriculture can have a positive effect upon student attitudes towards agriculture and those who work in the agriculture industry, even when taught within a school corporation located in a larger city.

Respondents' knowledge of agriculture and retention of that knowledge was the intent behind research question four. Students were asked questions concerning elements of animal agriculture, and agriculture in general, that were included in the instruction of all three themes, poultry, swine, and dairy. Of the questions asked respondents were able to correctly determine (92% correctly responded) that vaccines were helpful to an animal's immune system for fighting disease. Subjects were also successful in determining the number one livestock industry in the United States and the purpose that antibiotics serve in animal production and animal health. This supports Devlin (1998) indicating it is not necessary for students to have detailed scientific knowledge across a range of disciplines, but rather the emphasis should be upon building scientific awareness applicable to many fields of interest. This implies that respondents possess a measure of foundational scientific awareness and are able to apply that to animal agriculture.

Slightly less than half (48%) of the respondents knew the advantage that crossbreeding two purebred animals brought. In addition, subjects did poorest in questions regarding the

percentage of disposable income that American's spend for food, and the percentage of jobs in the United States that are related to the food and fiber system. It can be concluded that the former students of the biology class using agriculture as the context could transfer general information regarding health to related subject matter in animal health as taught during the class. Some could transfer this information very well. The teacher is to be commended on the achievement of these students since a subset of the population had this biology class six years ago. However, broad ideas concerning the scope and importance of the food and fiber system within the United States were much more difficult for students to recall. This implies that although animal agriculture was the theme for each of the six years of this biology class, it was still a biology class. Scientific principles were the main focus regardless of the context, and broad themes regarding the agricultural industry may not have received adequate attention.

Recommendations

The teacher responsible for teaching the biology course in this study was a graduate of a four-year teacher education program in Agricultural Education. In addition, he actively farmed with his family during the first 20 years of his teaching career. He did not teach Agricultural Science and Business but went directly into the science classroom. As a result he had a tremendous background and interest in agriculture and communicating that knowledge to his students. It is recommended that further research examine the relationship between the teacher's education and background and their ability to successfully utilize a thematic approach focusing on agriculture. Specifically, how much instruction in pre-service and in-service training is necessary for teachers to effectively utilize agricultural education in their classroom?

Agricultural Education is facing a shortage of qualified teachers today. As a result, it is recommended that Agricultural Education Teacher Preparation Programs explore the feasibility of offering courses of study for those pre-service teaching majors in programs that align closely with agriculture, specifically the sciences. Although this will not directly affect the shortage of traditional Agricultural Science and Business teachers, it may begin to influence the agricultural literacy of students who would not traditionally have the opportunity to participate in an Agricultural Science and Business program such as the one used in this study.

Many Agricultural Science and Business programs have recently begun to implement scientific principles into their existing curriculum (Osborne & Dyer, 1998). However, no evidence exists for the number of traditional science programs that utilize some form of instruction in food, agriculture, and/or natural resource systems. It is recommended that data be collected from school corporation science departments to determine the extent, if any, that these topics are being taught. It is possible that more agriculture and/or natural resource systems education is already occurring in science departments than is currently known.

Finally, the teacher responsible for teaching the biology course in this study secured funding for the various activities included in the course from a local Farm Bureau county affiliate. It is recommended that funding be made available for teachers interested in using agriculture as the context for teaching traditional science courses. Local Farm Bureau affiliates, commodity groups, and agricultural based corporations should be made aware of the opportunities available to support teachers and students interested in advancing agricultural literacy through science and agricultural science partnerships.

References

American Association for the Advancement of Science. (1989). Science for All Americans. New York: Oxford University Press.

Caine, R. N. & Caine, G. (1994). Making connections: Teaching and the human brain. Menlo Park, CA: Addison-Wesley Publishing.

Devlin, K. (1998). Rather than scientific literacy, colleges should teach scientific awareness. The Chronicle of Higher Education, XLIV (19), B6.

Dewey, J. (1938). Experience and education. New York, NY: Macmillan.

Enderlin, K. J., & Osborne, E. W. (1992). Student achievement, attitudes, and thinking skill attainment in an integrated science/agriculture course. Proceedings of the Nineteenth Annual National Agricultural Education Research Meeting. St. Louis, MO.

Enderlin, K J., Petrea, R. E., & Osborne, E. W., (1993). Student and teacher attitude toward and performance in an integrated science/agriculture course. Proceedings of the 47th Annual Central Region Research Conference in Agricultural Education. St. Louis, MO.

Henriques, L. (2000). Earth Systems in a Bottle. The Science Teacher, 67 (6), 48-51.

National Academy of Sciences, Committee on Agricultural Education in the Secondary Schools. (1988). Understanding agriculture: New directions for education. Washington, DC: National Academy Press.

National Commission on Excellence in Education (1983). A nation at risk: The imperative for educational reform. David P. Gardner (Chair). Washington, DC: United States Department of Education.

National Commission on Mathematics and Science. (2000). Before it's too late: A report to the Nation by the National Commission on mathematics and science teaching for the 21st century. Washington, DC: United States Department of Education.

Osborne, E. W. & Dyer, J. E. (1998). Attitudes of Illinois high school science teachers toward educational programs in agriculture. Journal of Agricultural Education, 39 (1), 8-16.

Roegge, C. A. & Russell, E. B. (1990). Teaching applied biology in secondary agriculture: Effects on student achievement and attitudes. Journal of Agricultural Education, 31 (1), 27-31.

Scotter, P.V., Bybee, R.W. & Dougherty, M.J. (2000). Fundamentals of Integrated Science. The Science Teacher, 67 (6), 24-28.

Secretary's Commission on Achieving Necessary Skills, U. S. Department of Labor (1991). What work requires of schools. Washington, DC: Author.

Steckelberg, M. L., Hoadley, M. R., Thompson, R., Martin, P. & Borman, G. (2000). The Science Teacher, 67 (6), 36-39.

Whent, L. S., & Leising, J. (1988). A descriptive study of the basic core curriculum for agricultural students in California. Proceedings of the 66th Annual Western Region Agricultural Education Research Seminar. Fort Collins, CO.

Teaching Biology Using Agriculture
as the Context: Perceptions of
High School Students

A Critique

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Agricultural awareness and its place in the formal educational system are of great importance. The author is to be commended for conducting an investigation into the experience of one teacher and his students' perceptions regarding the integration of agriculture into the biology curriculum to emphasize and teach biological principles. The literature review used in the paper provided a strong background on which to base the study. However, it is not clear that experiential learning is equivalent to learning in context as suggested by the author. Perhaps the theory behind this study is more a blending of theories than one theory in particular. Nonetheless, the basis for the study was well established.

The procedures for the study appear to be appropriate and the necessary cautions about any conclusions and meanings of the results of the study were made. It was interesting to note that the response rate was nearly 70%. This underscores the notion that people tend to stay close to home by in large after they receive formal education.

It would help if the tables had the scales used indicated at the bottom of the table. Also, it would be good to edit the paper for grammatical errors.

The paper generated some interesting data and overall findings. Clearly, if the data can be trusted, this teacher has had an impact on former student perceptions. There are some questions that should be addressed in discussion of this study:

- How confident should we be in the self-reported grades for a course taken several years earlier? Most people can't remember what they had for breakfast, if asked on any given day.
- Could it be that perceptions were based as much on what their circumstances are now rather than the biology course they took several years ago? How do we know?
- Respondents' knowledge of agriculture did not seem very high yet they seemed supportive of the agriculture production industry?
- Does this study suggest that an awareness of agriculture and use of agricultural examples in biology courses is the new standard we are to use for evaluating success of integrated programs? Is this eventually to be a recruitment tool? What is our purpose here? What is the "so what" of this study?
- What practical implications might we draw from this study.

ASSESSING AND COMPARING THE SCHEDULING SYSTEMS UTILIZED BY AGRICULTURAL EDUCATION PROGRAMS IN ILLINOIS

Introduction

Block scheduling has provided the freedom for many school systems across the country to expand course offerings with minimal staff changes. Block scheduling has the ability to reduce class sizes, reduce transition time, reduces daily preparation for classes, increases instructional time, and allows for more course offerings with similar financial parameters as compared to a traditional scheduling system (Carroll, 1989). Several studies (Baker & Bowman, 2000; Baker, Bowman, & Winstead, 1999; Wortman, Moore, & Flowers, 1997; Kirby, Moore, & Becton, 1996) have been conducted to evaluate the impact of block scheduling on specific populations in certain states. These studies have conducted research on determining the immediate impact of block scheduling, but provided minimal comparison between block and non-block programs.

The concept of block scheduling has been widely utilized by some states to aid in meeting the ever-changing demands presented by educational reform efforts. Some states have utilized the wait and see approach to the implementation of block scheduling. It is important to conduct follow-up research studies to make comparisons when needed. The issue of block scheduling is one of those areas of research demanding attention for additional research. It is important to assess the immediate impact of block scheduling, but it is just as important to determine the residual impact as well as the future implications associated with this scheduling system. Previous research in this area begins to shed some light on the benefits and implications that this scheduling concept has incurred on agricultural education programs across the country.

Kirby, Moore, and Becton (1997) found that teachers in North Carolina responded favorably to the implementation of block scheduling. Teachers indicated that laboratory activities could be conducted and completed more effectively, enrollment increased in agricultural education courses, and more time was found to prepare for courses. However, some teachers were concerned that the implementation of block scheduling did not decrease discipline problems, it was not easier to cover core competencies, and that attendance at FFA meetings did not increase. Wortman, Moore, and Flowers (1997) found that North Carolina agricultural students reacted positively to the implementation of block scheduling. Attributes associated with block scheduling, as perceived by students, were enrollment ease in agricultural courses, allowed greater time to complete assignments, and utilization of more teaching strategies and methods by teachers. Students also experienced greater positive effects on classroom instruction than on FFA and SAE activities.

Baker, Bowman, and Winstead (1999) found that teaching experience does impact the perceived value of block scheduling among agricultural teachers in Kentucky. Teachers with 1-10 years of teaching experience perceived greater value in block scheduling attributes than with teachers possessing 21 + years of teaching experience. All teachers agreed that block scheduling provided the most positive impact on classroom instruction than on extra-curricular events associated with agricultural programs, such as FFA and SAE activities. Baker and Bowman (2000) conducted a follow-up study on the longitudinal impact on agricultural programs in Kentucky. The findings affirmed the concept that teaching experience does impact the perceived

value of block scheduling over time. The perceptions of teachers possessing 1-10 years of teaching experience became more neutral over time in regards to the value of block scheduling. The value of block scheduling became more positive over time for teachers possessing 11-20 years of teaching experience. The perceptions of teachers possessing 21 + years of teaching experience became more negative to the value of block scheduling than any other group, over the two year period of evaluation. It is important to note that the vast majority of Kentucky agricultural programs are utilizing various forms of block scheduling for several years now.

All of the previous studies outline that the strength of block scheduling resides in classroom instruction. Teachers have more time to prepare, more time to conduct laboratory activities, and utilize more teaching methods and strategies to aid in the learning process. These attributes have helped teachers to realize the positive aspects of implementing and utilizing a block scheduling system. These research studies have also outlined the communication liabilities associated with block scheduling. Teachers continue to exclaim the implications associated with FFA and SAE activities. Communicating with students on a daily basis is a difficult task, but teachers continue to seek out new innovations to overcome these barriers. For these reasons, follow-up studies must be conducted to assure constant feedback on the issue of block scheduling.

Purpose and Objectives

The purpose of this study was to assess and compare the scheduling systems utilized by agricultural education programs in Illinois. In order to make effective assessments and comparisons between scheduling systems, specific objectives were constructed and maintained. Specific objectives of this research effort included:

1.) Determine the immediate impact of block scheduling among Illinois agricultural education programs utilizing the block scheduling system.
2.) Compare the impact of block scheduling among Illinois agricultural education programs by utilizing years of teaching experience and statewide districts.
3.) Compare the support of the block scheduling system between Illinois agricultural education programs utilizing block scheduling systems and traditional scheduling systems.

Methods and Procedures

The instrument used in this study was a revised version of the instrument used in Baker (et al., 2000) study. Revisions were made in the demographic section of the instrument. Teachers were asked the number of years of teaching experience, the size of the town in which the school resided, the state district in which the school resided, and if the school was currently utilizing a block system then which kind of block system. Non-block respondents were asked if their school system was considering the implementation of block scheduling as well as if they supported the concept. A panel of experts evaluated the content validity and the reliability of the instrument was duplicated from the Baker (et al., 2000) study, which yielded a Cronbach's alpha of a .89.

The other four sections of the instrument remained the same. Responses to questions in the next three sections were recorded on a 5 point Likert-type scale, where a response of +2 indicated strong agreement with the statement, a 0 representing a neutral stance, and -2 indicated strong disagreement. The second section contained questions related to changes associated with classroom instruction. The third section examined the changes associated with the overall agricultural education program, while the fourth section examined block scheduling effect on the school's FFA program. The final section was composed of three open-ended questions that encouraged teachers to provide additional information regarding block scheduling and to embellish the answers they provided in the four previous sections of the survey.

Data Collection

The instrument was mailed to all 350 secondary agricultural instructors residing in Illinois. The instructors received a self-addressed, stamped return envelope to ensure a quick response, along with a cover letter explaining the purpose of the study. As an extra incentive for the teachers to respond, the respondents were informed that they would be awarded five dollars for participating in this study. The responding teachers would receive their five dollars at the summer teachers' conference. Follow-up reminders were sent every 2 weeks via the state listserver. The study received 219 responses from the 350 mailed surveys resulting in a 63% response rate among agricultural education teachers. Surveys by early and late respondents were compared using procedures suggested by Miller and Smith (1983). Due to the response rate and no significant differences between early and late respondents, no other follow-up procedures were utilized.

One hundred and forty-one respondents (65%) of 219 responses indicated that their school was not currently utilizing a block system. Their schools were utilizing the traditional scheduling systems consisting of seven or eight daily class periods. The other seventy-eight responses (35%) indicated that their school district was currently using a block scheduling system of some form. It is important to note that a majority of the agricultural education programs within Illinois are one-teacher programs. Block scheduling respondents were separated into two classifications. The first classification was number of years of teaching experience and the second classification was the state-wide districts, in which their school resided in. The categories that separated teachers according to years of teaching experience were 1-10 years of experience (n=39), 11-20 years of teaching experience (n=20), and 21+ years of teaching experience (n=19). The categories that separated teachers according to state-wide districts were District I - northwest section of the state (n=23), District II - northeast section of the state (n=18), District III - west central section of the state (n=16), District IV - east central section of the state (n=14), and District 5 - southern section of the state (n=7).

Analysis of Data

The data were analyzed using the PC 10.00 version of the Statistical Package for the Social Science (SPSS). Descriptive statistics (mean, variance, and standard deviation) were derived initially. Each data classification was analyzed separately by using analysis of variance (ANOVA) to test whether statistically significant differences existed among responses with varying levels of teaching experience and among state-wide districts. The 0.05 level of significance was established a priori as the critical standard of rejection. If differences were

found, the ANOVA procedure was followed up by using the Scheffe's post hoc test to determine the groups that were statistically different from each other. Descriptive statistics (frequency & percentages) were used to analyze the demographic data among non-block scheduling respondents.

Results and Findings

Demographic data revealed that the most popular block scheduling system, utilized by school districts containing an agricultural program, was the eight-block schedule (A & B days) as well as several modified versions of the eight-block schedule. The demographic data also outlined the support among teachers on the block scheduling system. Eighty-four percent of the on-block teachers indicated that they supported block scheduling because it allowed them to have more time for lab activities and hands on experiences. An additional reason, given for the acceptance of the block scheduling, was the flexibility in class schedules making it easier to enroll in electives. However, non-support among this group was mainly attributed to the communication barrier. The respondents indicated that they had difficulty communicating with students on the daily basis.

Table 1 highlights the distribution of respondents according to scheduling system. Table 1 also divides respondents into state-wide districts to indicate frequency of block scheduling implementation. Comparisons were also made among districts where block scheduling was initiated and the percentage of agricultural programs utilizing block scheduling in each district. The highest adoption rate of block scheduling among the districts occurred in District 1 (29%), while the lowest was reported in District 5 (9%).

Table 1. Respondent Demographics by State-Wide Districts

Block Respondents		Non-Block Respondents	
District	Percentage	District	Percentage
1	29%	1	14%
2	23%	2	24%
3	21%	3	19%
4	18%	4	23%
5	9%	5	20%
Totals	100% (N=78)		100% (N=141)

Table 2 indicates the frequency and percentage of schools considering block scheduling and support levels for block scheduling. District 1 has the highest percentages of schools (35%) considering the implementation of block scheduling, while District 3 has the lowest (17%) percentage of schools that are considering the implementation of block scheduling. A majority of the non-block schools in Districts 4 (76%) and District 2 (75%) indicated the strongest support for the implementation of block scheduling.

Twenty-seven percent of the non-block respondents reported that their school was considering block scheduling in the future. However, a majority of the non-block respondents (73%) indicated that their school would remain on the traditional scheduling system. A majority (67%)

of the non-block respondents indicated support for block scheduling, while 33% said they would not. An overwhelming majority of the respondents believed that block scheduling would give them more time for lab activities, more opportunities to enroll in agricultural classes, and in general there was more time for planned activities. The reasons given for not supporting block scheduling was that teachers would not see students on the daily basis, block scheduling would create problems with FFA, it would be hard to prepare for CDE's, and the class periods were too long.

Table 2. Additional Demographic Data on Non-Block Respondents by Districts

School Considering Block Scheduling				Do You Support Block Scheduling			
District	Yes	No	%Yes	District	Yes	No	%Yes
1	7	13	35%	1	11	7	61%
2	9	24	27%	2	24	8	75%
3	4	20	17%	3	13	9	58%
4	9	23	28%	4	22	7	76%
5	8	19	30%	5	14	11	56%
Totals	37	99	27%		84	42	67%

**Note: Some respondents did not identify their district, resulting in their exclusion from this table

Respondents were asked the town size, in which their school resided. The schools, which adopted block scheduling, tend to reside in smaller towns. A one represented a town size of 2,500 or less, a two represented a town size of 2,501 to 10,000, a three represented a town size of 10,001 to 25,000, a four represented a town size 25,001 to 50,000, and a five represented a town size of 50,000 plus. The average town size for schools utilizing block scheduling was 1.46 and the average town size not utilizing block scheduling was 1.82. This is an indication that smaller schools are utilizing block scheduling to compensate for the increase in educational reform efforts.

Results of 2000 data set

Table 3 shows the descriptive statistics as well as the ANOVA and Scheffe procedures on the 2000 data set. These procedures were used to test the attitudes and perceptual differences existing among teachers when grouped by years of teaching experience. The one-way ANOVA procedure indicated significant differences at the 0.05 alpha level on the following variables: "We cover more subject matter"; "Longer class periods allow me to use multiple methods of presentation"; "More integration of the subject matter is allowed"; and "FFA as a co-curricular part of the agriculture program has become more positive".

The Scheffe post host procedure revealed that differences existed between the teachers in Group 2 (11-20 years of teaching experience) and the teachers in Group 3 (21 or more years of teaching experience). The results found that the teachers in Group 2 possessed a higher degree of agreement that block scheduling helped them "cover more subject matter", "use multiple teaching methods", and "integrate subject matter", while the teachers in Group 3 tended to have a

lower degree of agreement. There were no significant differences found between Groups 1 & 2 as well as Groups 1 & 3.

Table 3. Means and Analysis of Attitudes and Perceptions of Agriculture Instructors Toward Block Scheduling in Illinois When the Respondents Were Grouped by Years of Teaching Experience (N=78).

Variables	Teaching Experience 1 mean S.D n=39	2 mean S.D n=20	3 mean S.D n=19	F value df (2,77)	F prob.
Curriculum Involvement	.18	.55	.26	1.11	.336
	.85	.89	1.05		
Student Rapport	.46	.85	.26	1.29	.283
	1.23	.99	1.24		
Work Improvement	.56	1.05	.53	1.56	.217
	1.12	.89	1.22		
Student Needs	1.08	1.10	.58	2.06	.135
	.77	.85	1.30		
Planning Time	.90	1.20	1.05	.45	.638
	1.14	1.06	1.35		
Teaching Methods	1.34	1.70	1.21	1.82	.169
	.74	.80	1.03		
Subject Matter	-.02 [ab]	.05 [b]	-.63 [a]	4.36	.016 *
	1.31	1.00	1.16		
Transfer Students	-.02	-.17	-.21	.82	.446
	.56	.86	.92		
Portfolios	.90	1.05	.53	1.88	.159
	.88	.83	.90		
Time Wasted	.49	.85	1.11	1.54	.221
	1.32	1.39	1.20		
Thorough Lessons	1.38	1.55	1.00	2.45	.093
	.75	.51	1.11		
Presentation Methods	1.51	1. 85	1.47	3.63	.031 *
	.56	.37	.51		
Enrollment Increases	.79	1.15	1.00	.80	.453
	1.06	.99	1.11		
Student Quality	.38	.80	.16	1.74	.182
	1.14	1.06	1.07		
Positive View by School	.46	.95	.26	2.36	.101
	.97	.94	1.24		
Subject Integration	.87 [ab]	1.30 [b]	.63 [a]	3.35	.040 *
	.83	.80	.80		

More Courses Offered	.33	.70	.47	.68	.508
	1.13	1.08	1.22		
Co-op Programs	.28	.45	.37	.27	.763
	.83	.83	.90		
Opportunities Electives	.92	1.05	1.26	.64	.533
	1.06	1.15	1.05		
Increased Membership	.46	.80	.58	.79	.456
	.91	.77	1.26		
Increase in Females	.44	1.00	.58	2.73	.072
	.79	.79	1.12		
Increase in Minorities	-.18	.15	-.17	.61	.546
	.32	.37	.88		
FFA Co- Curriculum	.44 [a]	1.00 [b]	.58 [ab]	3.17	.048 *
	.82	.65	.96		
CDE Preparation	.26	.80	.21	1.72	.186
	1.21	.95	1.27		
SAE/Records	.44	.90	.37	1.53	.224
	1.12	.85	1.21		
Leadership Activities	.13	.40	.26	.43	.650
	1.13	.82	1.19		
Members not in class	.62	-.17	.42	1.18	.314
	1.48	1.49	1.39		
Adverse Impact FFA	-.02	-.55	-.47	1.62	.205
	1.16	1.19	1.31		
Flextim Helped FFA	.21	.75	.21	2.98	.057
	.77	.97	.92		
Inform Students FFA	-.33	-.02	-.42	.91	.407
	1.30	1.05	1.12		

Teaching Experience: Group 1:1-10 years, Group 2:11-20 years, Group 3: 21 or more years
Response scale: +2=Strongly agree, +1=Agree, 0=Neutral, -1=Disagree, -2=strongly disagree
*Note: Scheffe procedure identified means that were significantly different at the .05 level with a different letter superscript among groups. Means with the same superscript indicates no significant differences were found among groups sharing a given superscript.

The Scheffe post host procedure revealed that differences existed between the teachers in Group 2 (with 11-20 years of teaching experience) and the teachers in Group 1 (with 1-10 years of teaching experience). The results found that the teachers in Group 2 seemed to agree that block scheduling helped "FFA to be viewed more positively as a co-curricular component", while the teachers in Group 1 tended to take an impartial stance. There were no significant differences found between Groups 3 & 2 as well as Groups 3 & 1.

Table 4 shows the descriptive statistics as well as the ANOVA and Scheffe procedures on the 2000 data set. These procedures were used to test the attitudes and perceptual differences existing among teachers, when grouped by location of the school systems within established

state-wide districts. The ANOVA procedure indicated significant differences at the 0.05 alpha level on the following variables: " I know my students better and have established better rapport with them"; "Longer class periods allow me to use multiple methods of presentation"; "It is easier to prepare for FFA Career Development Events"; and "There is more time for record keeping with SAE Programs".

Table 4. Analysis of Attitudes and Perceptions of Agriculture Instructors Toward Block Scheduling in Illinois When the Teachers Were Grouped by Districts (N=78).

	Districts						
	1	2	3	4	5		
	mean	mean	mean	mean	mean		
	S.D	S.D	S.D	S.D	S.D		
Variables	n=23	n=18	n=16	n=14	n=7	F ratio	F prob.
Curriculum Involvement	.30	.17	.44	.21	.43	.24	.914
	.82	1.10	.89	.89	.98		
Student Rapport	.78	-.02	1.06	-.02	.43	2.52	.048 *
	.90	1.55	.77	.83	1.72		
Work Improvement	.96	.50	.94	-1.70	1.00	2.35	.062
	.88	1.42	.77	1.24	.58		
Student Needs	.78	.83	1.13	.86	.29	1.06	.383
	1.04	1.29	.70	.53	.76		
Planning Time	1.17	.61	1.56	.86	.57	1.93	.115
	1.07	1.42	.73	1.35	.79		
Teaching Methods	1.57	1.17	1.56	1.14	1.17	1.29	.279
	.66	1.20	.51	.95	.49		
Subject Matter	-.02	-.44	.50	-.43	.43	1.93	.114
	1.35	1.20	1.37	1.02	.79		
Transfer Students	.00	-.39	.25	.14	-.14	1.98	.107
	.67	.92	.77	.53	.38		
Portfolios	.96	.61	1.19	.43	1.14	2.09	.090
	.88	1.09	.66	.76	.69		
Time Wasted	1.26	.56	.31	.29	1.29	2.27	.070
	.92	1.50	1.35	1.49	.95		
Thorough Lessons	1.48	1.17	1.44	.93	1.86	2.13	.085
	.73	.99	.51	1.00	.38		
Presentation Methods	1.74 [b]	1.61 [ab]	1.69 [b]	1.07 [a]	1.86 [b]	5.65	.010**
	.45	.50	.48	.47	.38		
Enrollment Increases	1.04	.61	1.19	.86	1.00	.74	.569
	.98	1.24	.91	1.10	1.00		
Student Quality	.43	-.02	.75	.29	1.00	1.39	.247
	1.12	1.06	.93	1.44	.58		
Positive View by Sch.	.57	.28	1.00	.29	.57	1.27	.290
	1.12	.96	1.03	1.20	.53		

Subject Integration	1.09	.83	1.25	.43	.86	2.18	.080
	.85	.92	.77	.76	.69		
More Courses Offered	.74	.39	.81	-.02	-.29	2.01	.101
	.92	1.09	1.11	1.33	1.25		
Co-op Programs	.35	.28	.38	.29	.57	.17	.952
	.78	.96	.96	.47	1.13		
Opportunities Electives	1.17	.94	1.13	.86	1.00	.24	.913
	1.03	1.21	1.15	1.17	.58		
Increased Membership	.65	.28	.81	.57	.57	.68	.607
	.98	1.18	.91	.76	.98		
Increase in Females	.48	.39	1.00	.71	.57	1.21	.315
	.95	1.04	.82	.61	.98		
Increase in Minorities	-.18	-.17	.25	-.02	.00	.88	.483
	.43	.69	.58	.27	.58		
FFA Co-Curriculum	.87	.28	.94	.43	.29	2.45	.054
	.81	.96	.77	.51	.95		
CDE Preparation	.74	-.06	.94	-.14	-.14	3.13	.020 *
	1.14	1.43	.77	1.03	.90		
SAE/Records	.52	.22	1.31	.29	.14	3.13	.020 *
	1.12	1.26	.60	.83	1.21		
Leadership Activities	.43	-.28	.69	-.17	.29	2.27	.070
	.99	1.07	.95	1.11	1.11		
Member not in class	.74	.56	.13	.14	.14	.65	.629
	1.54	1.46	1.31	1.46	1.68		
Adverse Impact FFA	-.02	-.39	-.21	-.14	-.27	.33	.855
	1.41	1.14	1.21	1.05	1.21		
Flextime Helped FFA	.39	.17	.63	.21	.29	.68	.609
	1.03	1.04	.72	.58	.76		
Inform Students FFA	-.48	-.39	-.02	-.02	-.29	.61	.660
	1.24	.14	1.39	.92	1.38		

Agricultural Programs within (Districts): 1=NW (Northwest), 2=NE (Northeast), 3=WC (West Central), 4=EC (East Central) &, 5=S (South).

*Note: Scheffe procedure identified means that were significantly different at the .05 level with a different letter superscript among groups. Means with the same superscript indicates no significant differences were found among groups sharing a given superscript.
*p<.05

An analysis of variance showed significant differences in responses to the statement "I know my students better and have established better rapport with them". Teachers in District 3 agreed it was easier to establish a rapport with block scheduling, while teachers in Districts 2 & 4 tended to be more neutral. Teachers in Districts 1 & 5 tended to slightly agree it was easier to establish a rapport with students.

An analysis of variance also indicated significant differences in perceptual responses to the statement "I am able to utilize more presentation methods for classroom instruction." Scheffe post host procedure also indicated that there were significant differences among teachers in the five districts. Teachers in Districts 1, 3, & 5 strongly agreed that block scheduling helped them better utilize multiple forms of presentation, while teachers in District 4 tended to have a lower degree of agreement. The perceptions of teachers in District 2 tended to reside in the middle of agreement and strong agreement on this item.

The ANOVA procedure also outlined significant differences in the statement "It is easier to prepare for Career Development Events". Teachers in Districts 1 & 3 tended to agree that it was easier, while teachers in Districts 4 & 5 tended to lean slightly toward disagreement on this item. However, teachers in District 3 tended to be more neutral.

Finally, the significant differences were also found on the statement "It was easier to find time to work on SAEP's and recordbooks". Teachers in District 3 tended to agree that it was easier to find the time to work on SAEP's and recordbooks, while teachers in District 5 were more neutral on this item. Teachers in Districts 1, 2, & 4 tended to slightly agree that they found more time to work on SAEP's and the activities associated with it.

Open ended questions, such as: "What do you like most about block scheduling?"; "What do you like least about block scheduling?"; and "If block scheduling is better, then why is it better?" were also used to help the respondents elaborate further on their comments regarding the items on the block scheduling instrument. Here are the summaries of the responses given by teachers regarding these questions.

"What do you like most about block scheduling?" The most popular responses were:

- More time for class, labs, and field trips
- More options for students
- Student quality increases and greater number of students are exposed to agriculture
- More prep planning time
- More the time allowed for labs & study in class
- High percentage turned in homework
- The more time to work on projects or activities /longer periods
- Depth of information is much deeper

The teachers were also asked the question, "What do you like least about block scheduling?" The most popular responses were:

- I don't see the same kids every day
- I don't always have all FFA members in class each semester
- Need to restructure lessons and course
- Students don't retain information - have to review every class period
- Must plan informing students of activities further in advance
- Hard to find related activities to keep from lecturing the whole period and students miss a lot, if they only miss one day

When asked to respond to the question "If block scheduling is better, then why is it better? A majority of teachers gave the following responses:

- It allows for more teaching techniques
- Only if you have 1-2 preps/otherwise a nightmare
- Kids learn quickly how to tune you out
- Class numbers raise, but quality decreases
- It is better, because there are some many things you can do in 1 1/2 hrs
- I can start and finish labs on the same day, rather than start and stop
- Students can focus on fewer subjects and increased class/lab/shop time

Conclusions

The following conclusions were drawn from the findings of the study:

- Overall, Illinois agricultural teachers perceived block scheduling in a positive manner.
- A majority of Illinois non-block agricultural teachers support the implementation of block scheduling.
- Illinois town size has an effect on whether or not block scheduling is utilized.
- Certain Illinois geographical regions had a tendency to prefer the block scheduling for their scheduling system.
- An affirmation that the main strength of block scheduling is the power to improve classroom instruction.

Illinois has been slow to adopt block scheduling into schools possessing an agricultural program. Thirty-five percent of these schools have utilized the block concept as a scheduling system, most of which reside in small, rural towns. However, agricultural teachers in Illinois view block concept as a positive scheduling system for their programs. The demographic data indicates that 84% of the block teachers and 67% of the non-block teachers support the concept of block scheduling. The statistical data reveals a limited number of negative means on the 30 items being analyzed. A majority of the negative means reside in the extra-curricular activities associated with the agricultural program, such as FFA and SAEP's. It is recommended that non-block teachers should encourage their administrators to implement block scheduling, because of the benefits associated with improving classroom instruction.

It is also concluded that geographic location and town size impact the utilization of block scheduling in Illinois. The districts that have utilized block scheduling at a higher frequency possess many one-teacher programs and smaller school districts. This affirms the concept that block scheduling can increase course offerings, reduce class size, and reduce the daily teacher workload without increasing staff size and financial inputs. Illinois still remains a very rural state possessing many rural school districts. Block scheduling is a concept that needs to be seriously considered, if a school district is debating educational reform efforts to improve school achievement, especially if it is rural district. Studies indicate that the strength of block scheduling is the improvement of classroom instruction. Teachers and students agree that

classroom instruction improves, if block scheduling is utilized correctly. Teachers and students have to make the necessary changes to make block-scheduling work at its ultimate levels.

Recommendations

- Non-block teachers should encourage and influence their administrators to implement block scheduling, so that they could improve the instructional environment within their programs.
- Frequent in-service and pre-service workshops are needed to update teachers on educational research findings on block scheduling.
- Further studies are needed to determine the overall impact of block scheduling on agricultural programs.

References

Baker, A. J. & Bowman, K. (2000). A longitudinal study of the impact of block scheduling on agricultural education programs. Proceedings of the 54th Annual AAAE Central Region Research Conference and Seminar in Agricultural Education, St. Louis, MO, 95-106.

Baker, A. J., Bowman, K. & Winstead, L. (1999). Attitudes and perceptions of agricultural instructors toward block scheduling in Kentucky. Proceedings of the 49th Annual Southern Regional Agricultural Education Research Meeting, Memphis, TN, 218-227.

Carroll, J. (1989). The Copernican plan: Restructuring the American high school. Regional Laboratory for Educational Improvement of the Northeast and Islands 1-15.

Miller, L. E. &Smith, K. (1983). Handling nonresponse issues. Journal of Extension, 21, 45-50.

Moore, G., Kirby, B. & Becton, L. K. (1996). Block scheduling's impact on instruction, FFA, and SAE in agricultural education. Journal of Agricultural Education, 38(4), 1-10.

Wortman, J., Moore, G. & Flowers, J. (1997). Students' perceptions of block scheduling in agricultural education. Proceedings of the 24th National Agricultural Education Research Meeting, Las Vegas, NV, 440-447.

Assessing and Comparing the Scheduling Systems Utilized by Agricultural Education Programs in Illinois

A Critique

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Block scheduling has become the focus of a number of informative studies in recent years. The authors cite a number of recent studies conducted by agricultural education researchers that identified commonly perceived benefits and barriers of this course offering strategy. Review of the paper resulted in a number of questions that may merit discussion by the author(s) and others. For example, how does the related literature define impact as used in this study? What theory and earlier research findings exist that inform us that different districts of the state, school sizes, have different adoption rates of block scheduling? What forms and types of evidence justify switching from traditional to block scheduling?

When considering the categorical names of each score (e.g., +2 = strongly agree, +1=agree, 0 = neutral, -1=disagree, -2=strongly disagree) what do the means and standard deviations indicate about the attitudes and perceptions of the agricultural education teachers ? Which variables or characteristics provide the greatest and least amount of agreement among the teachers from different districts and of different categories of teaching experience?

What other teacher and learner attributes, characteristics, or outcomes relating to block scheduling should be understood prior making or confirming the value of major changes in practice and policy? Considering the nature and magnitude of the data collected from this population, discuss the implications of your recommendation that non-block teachers should encourage their administrators to implement block scheduling while further recommending (additional) studies are needed to determine the overall impact of block scheduling on agricultural education programs. How do the findings, conclusions, and recommendations of this study agree with or differ from those reported by Baker et al. (2000), Baker et al. (1999), and Wortman et al. (1997)?

This study obtained perceptions from an additional group of teacher respondents with perceptions concerning the value and place of block scheduling. Ultimately we need to know how it affects student learning. The author(s) is (are) commended for investigating a topic of current concern. The profession looks forward to seeing additional scholarship from you relating to this important approach to delivering secondary agricultural education programming!

CHARACTERISTICS OF ELEMENTARY TEACHERS EXPLAINING INTEGRATION OF AGRICULTURAL AWARENESS ACTIVITIES IN THE CURRICULUM

Introduction

An integrated curriculum holds a promise to higher quality of learning and greater achievement (Baily & Hughes, 1999; Bottoms, 1998; Grubb, 1999; Hoachlander, 1999; Lynch, 1999b; National Council for Agricultural Education, 1999; Southern Regional Education Board, 1999). Students experience greater success in learning when they connect the content to real world applications (Bottoms & Presson, 2000; Kaufman, Bradby, & Teitelbaum, 2000; Newmann & Wehlage, 1995; U.S. Department of Education, 1999). The agricultural, food, fiber and natural resource system is the largest employer in America and plays a significant role in the nation's economy (American Farm Bureau Federation, 1998). The integration of agriculture in the elementary curriculum has been recommended by Birkenholz, Frick, Gardner, and Machtmes (1994), Leising and Zilbert (1994), Terry, Herring, and Larke (1992), and Frick, Birkenholz, and Machtmes (1995).

The philosophical base underpinning the need for agricultural awareness in elementary classrooms was based on Dewey's (1938) philosophy of education. Dewey stated that "anything which can be called a study, whether arithmetic, history, geography, or one of the natural sciences, must be derived from materials which at the outset fall within the scope of ordinary life experience" (p. 73). Further, Dewey expounded,

> It is a sound educational principle that students should be introduced to scientific subject matter and be initiated into its facts and laws through acquaintance with everyday social applications. Adherence to this method is not only the most direct avenue to understanding science itself as the pupils grow more mature it is also the surest road to the understanding of the economic and industrial problems in present society (p. 80).

Dewey (1938) believed that students were largely the products of the application of science in production and distribution of commodities and services. Furthermore, Dewey (1938) posited that the process of "education through occupations" developed relationships among people and social groups. Fasheh's (1990) description of a community-based education expanded on Dewey's beliefs. Fasheh believed that the role of education in community transformation should be (a) informed by the real needs of the community, (b) creating a feeling of self-worth, empowerment, and self-acceptance, (c) to build human resources to be creative, life-long learners, and (d) to facilitate networking, communication, and the exchange of ideas and experiences among various groups. Further, Fasheh advocated that a curriculum be flexible and dynamic enough to provide a supportive environment for learners to develop their self-worth and respond to their various needs in a constantly changing environment. Feelings of self-worth should be connected to concrete things and to production that enhances life (Fasheh, 1990). The social-economic activities of America have changed since Dewey's assertions. As America's economy, political culture, and society evolved from being agricultural-industrial to technological-informational, fewer citizens see the value of agricultural knowledge and the education of the agricultural, food, fiber and natural resource systems (De Christopher, 1993). Fasheh (1990) eloquently described this phenomena, "An education that responds to real needs,

empowers people, builds networks, raises questions about assumptions and consequences, keeps oscillating between life and structures, and facilitates the transformation of mental and social structures is usually not compatible either with existing economic, political, and social orders or with the dominant values and mental patterns" (p. 34-35). However, it is important that citizens in a democracy know and understand that the foundation of the economy and society rests on agriculture, food, fiber and natural resource systems because indigenous qualities of internal strength, "feeling at home" within the environment, and the ability to adapt to diverse conditions help species survive overtime (Fasheh, 1990). Therefore, agriculture, food, fiber and natural resource systems provide concrete and production-oriented topics worthy of study in today's curriculum. Furthermore, Mawby (1985) suggested "few issues are of greater importance to the world than adequate food supplies, proper food use, and knowledge about the components of the agricultural industry" (p. 7). Spokespersons outside of agricultural education have recommended that agricultural knowledge be taught in the elementary school grades (De Christopher, 1993; Lucht, 1993). Moreover, several educators have recommended for many years that agriculture should be taught in the elementary school curriculum (Fox, 1932; Herr, 1968; Keenan, 1970; Shively, 1936; Snowden & Shoemake, 1973; Swan & Donaldson, 1970). Recently, as a result of a strategic planning effort, the National Council for Agricultural Education (1999), stated that "agricultural education envisions a world where all people value and understand the vital role of agriculture, food, fiber and natural resource systems in advancing personal and global well-being" and that "agricultural education prepares students for successful careers and a lifetime of informed choices in the global agriculture, food, fiber and natural resource systems." The National Council for Agricultural Education recommended that to achieve its vision and mission, agricultural education "must engage in a global social contract to serve the needs of society, improve the quality of the environment, build leadership and collaboration, and develop new approaches to new challenges." Because six percent of the school population successfully complete agricultural coursework, teachers, agricultural groups, and educational organizations must collaborate to implement an integrated, contemporary agricultural-based curricula for the other 94 percent of students to have the knowledge required for a lifetime of informed choices in agriculture, food, fiber and natural resource systems (National Council for Agricultural Education, 1999).

Currently, several researchers have researched Dewey's philosophy for integrated, thematic, applied, contextual, and authentic pedagogy. Lynch (1999a) found that citizens wanted career education and work skills included as critical components in the K-12 curriculum. Lynch found that students learned better when they were shown connections between that which must be learned and how it is used in the real world. "Most students need context to understand, learn, and remember" (Lynch, 1999a, p. 5.16). It is imperative that children be taught an integrated curriculum in their early years because "what is learned...how it is learned...and adapting in the early years is the greatest predictor for subsequent success in education and in workplaces" (Lynch, 1999a, p. 4.4). Good connections between the subjects taught in school, home, and communities during the early years comprise a critical foundation to continuing education and lifelong learning because the process of creating connections in the brain is most pronounced between the ages of 2 and 11 (Lynch, 1999a). Therefore, children need to be taught age-appropriate career information that connects education to applications in the real-world (Lynch, 1999a). Further, Newmann and Wehlage (1995) found that authentic pedagogy helped students make connections to the world beyond the classroom. Authentic pedagogy boosted the academic

performance of elementary, middle, and high school students equitably among all social backgrounds in both mathematics and social studies (Newmann & Wehlage, 1995). Authentic pedagogy promoted high quality intellectual work because it required students to think, develop in-depth understanding, and apply academic learning to important, realistic problems (Newmann & Wehlage, 1995). Instructional practices that promote quality learning experiences for students commonly integrate academic content and the context of career, business, and technical studies. The U. S. Department of Education (1999) advocated that, "integration provides instruction in a meaningful, relevant setting that will improve student motivation, promote active learning, and ultimately raise student achievement" (p. 9). Kaufman, Bradby, and Teitelbaum, (2000) found that students who perceived their academic and vocational teachers were working together had greater achievement in math, reading and writing skills. There were also some indications that students doing joint projects with both a vocational and academic teacher improved a school's academic achievement (Kaufman, Bradby, & Teitelbaum, 2000). All teachers in all schools must include the study of agriculture in a relevant, integrated instructional approach for all students to achieve conversational literacy in agriculture, food, fiber and natural resource systems (National Council for Agricultural Education, 1999). Specifically, the National Council for Agricultural Education (1999) identified two goals that will require inter-disciplinary integration among teachers: (a) "All students have access to seamless, lifelong instruction in agriculture, food, fiber and natural resource systems through a wide variety of delivery systems and educational settings," and (b) "all students are conversationally literate in agriculture, food, fiber and natural resource systems." Elementary and middle school teachers recommended that direct instruction about the agri-food system begin in the early elementary school curriculum and that a thematically-based, integrated curriculum would be an effective way to increase agricultural awareness in schools (Trexler, Johnson, & Heinze, 2000). For the purpose of this study, the term agricultural awareness was operationally defined as "experiencing or exploring agriculture as it relates to the subject matter being studied or context of life being lived; the ability to identify the connections of agriculture to areas of study or life."

Agricultural educators have learned that teachers and students vary in their perceptions and knowledge of agriculture. According to some authors, elementary teachers have little knowledge of agriculture (Swan & Donaldson, 1970; Terry, Herring, & Larke, 1992). However, it has been shown that preservice elementary teachers (Humphrey, Stewart, & Linhardt, 1994) and secondary education teachers (Harris & Birkenholz, 1996) were knowledgeable of and had positive attitudes toward the industry of agriculture. Trexler, Johnson, and Heinze (2000) found that teachers believed that schools play an important role in food system education. Although teachers believed that understanding the connections between humans and the environment was important, they acknowledged that students do not comprehend the food production, distribution, and preservation system and few teachers felt the need to educate students about the connections between people, soil, and food (Trexler, Johnson, & Heinze, 2000). Trexler, Johnson, and Heinze (2000) found that "teachers perceived that students do not understand where their food comes from and do not care how it arrives at their table" (p. 34). In addition, students lacked basic knowledge of agriculture according to Horn and Vining (1986, cited in Herren & Oakley, 1995).

A teacher's background and experience play a significant role in educating students about agriculture. The literature indicates that teachers with agricultural experience had more

agricultural knowledge and more accurate perceptions of agriculture (Humphrey, Stewart, & Linhardt, 1994; Terry, Herring, & Larke, 1992). Further, preservice elementary teachers with agricultural experience were more confident in teaching agriculture (Humphrey, Stewart, & Lindhardt, 1994). A teacher's knowledge, attitude, and expectations of a new curriculum has been shown to be related to the amount of new curriculum taught (Rudd & Hillison, 1995). Furthermore, elementary teachers in Michigan were sometimes comfortable using the problem solving method, connecting science teaching to community problems, and using agriculture as a context for science, and they moderately supported the concept that science can be taught through agricultural examples (Trexler & Suvedi, 1998). In addition, Balschweid, Thompson, and Cole (1998) found that K-12 teachers perceived their students most interested in animals, crops, and food processing. Trexler, Johnson, and Heize (2000) found that elementary and middle school teachers wanted to teach students how to make better consumer choices about their food. Elementary teachers in Texas taught agricultural knowledge and concepts approximately eight hours a year according to Terry, Herring, and Larke (1992). However, Trexler, Johnson, and Heinze (2000) found that elementary and middle school teachers made connections to the food system in limited areas of the curriculum. Moreover, although teachers taught issues related to agriculture, their class discussions did not contain agri-food system content (Trexler, Johnson, & Heinze, 2000).

Intervention programs with elementary teachers have been positive. Trexler and Suvedi (1998) found that teacher perceptions of agriculture and confidence toward integrating agriculture into science improved after a curriculum intervention program on science and agriculture. Moreover, teachers were more comfortable to integrate agricultural activities in the curriculum if they received background materials, educational training, resources, and support (Trexler, Johnson, & Heinze, 2000). Balschweid, Thompson, and Cole (1998) found that 90 percent of the elementary and secondary teachers who participated in an agricultural literacy in-service program integrated agriculture into at least one of their lessons. Herren and Oakley (1995) concluded that elementary teachers taught how to integrate Agriculture in the Classroom resources, reported higher student achievement of agricultural concepts.

The role of the teacher has been very important for integrating agriculture in the elementary curriculum (Terry, Herring, & Larke, 1992). Tenably, if teachers are change agents for integrating agriculture into the elementary curriculum, then their characteristics and perceptions would affect the integration of agriculture into the elementary curriculum. This study was based on the premise that "values, attitudes, needs, and wishes, as well as impulses and motives, are projected upon objects and behaviors outside of the individual" (Kerlinger, 1973, p. 514). Therefore, people perceive the world through their own set of values, beliefs, attitudes, and intentions, which lead to behaviors (Fishbein & Azjen, 1975). Although some researchers (Humphrey, Stewart, & Lindhardt, 1994; Terry, Herring, & Larke, 1992; Trexler, Johnson, & Heinze, 2000) studied pre-service and in-service elementary teachers' knowledge and perceptions of agriculture, the agricultural education profession has not sufficiently investigated elementary teachers' characteristics and their perceptions towards integrating agriculture into the curriculum related to the extent they conducted agricultural activities in their pedagogy.

Purpose and Objectives

The purpose of this study was to explore the following question: To what extent can the variability in the sum of variables related to the number of agricultural awareness activities conducted be explained by variables that describe selected characteristics of elementary teachers in east central Iowa? The independent variables investigated in the study were: degree of education, grade level, agricultural classes, agricultural experience, and perceptions towards integrating agriculture. The dependent variable of this study was the number of agricultural awareness activities conducted.

Procedures

The target population of this study was elementary teachers in a seven county educational service area in east central Iowa. There were 52 school districts in the target population. The districts ranged in size from very small with six students to the second largest school district in Iowa with over 17,000 students. The mean size of the school districts in the sample was 5,725 students per district. The Grant Wood Area Education Agency mailing list of teachers served as the frame. There were 2,067 teachers in the frame who taught in 33 public school districts and 19 private school districts. An equal-probability-of-selection method sample of 689 teachers was selected using a systematic sampling method (Babbie, 1990). Forty-five percent of the teachers (311/689) returned the questionnaire. Since some questionnaires were returned blank or partially completed, the data sample consisted of 281 questionnaires (41% response rate).

The instrument used to collect the data of this study was a mailed questionnaire containing 72 items in three parts. The researchers created the instrument (Knobloch & Martin, 1998). Part 1 contained 14 items related to beliefs about integrating agriculture into elementary classes. Perceptions were measured using a 5 point summated rating scale. Teachers were asked to respond to each statement using the following rating scale: Strongly Disagree (SD = 1), Disagree (D = 2), Neutral (N = 3), Agree (A = 4), and Strongly Agree (SA = 5). Part 2 contained 48 items regarding agricultural activities in the classroom. The activities related to general agriculture and the seven career areas of agriculture—agricultural mechanics, agricultural processing, agricultural production, agricultural sales and services, forestry, horticulture, and natural resources and conservation (Newcomb, McCracken, & Warmbrod, 1993). The teachers were asked to respond to the number of times that they had conducted the activities in their instruction during the past year. Their choices were: Never = 0, Once a year = 1, Twice a year/once a semester = 2, and Three or more times a year = 3. Part 3 contained ten items related to demographic information (Knobloch, 1997).

Content and face validity was established from a panel of elementary teachers, a school superintendent, a professional accountant, and faculty members of the Department of Agricultural Education and Studies at Iowa State University. Items related to the agricultural activities were teaching ideas developed by elementary teachers in the Teachers' Academy on Agricultural Awareness workshops. The estimates of reliability, using Cronbach's alpha, were 0.88 for the items related to Integration of Agriculture. The instrument was reliable because alpha was greater than .50-.60 (Nunnally, 1967).

Questionnaires were sent to the elementary teachers at their school addresses. A follow-up postcard was sent as a reminder 10 days after the initial mailing. One plausible reason for the lower response rate was because there was not enough time to send subsequent follow-up reminders due to the end of the school year. Non-response error was controlled by the "double-dip" method (Miller & Smith, 1983). Five percent of the non-respondents were randomly sampled. Their responses were compared to respondents using summated means. T-tests indicated no significant differences between the non-respondents' and respondents' responses on ten randomly selected items.

Analysis of Data

Correlational-regression statistics were used to analyze the data sample. The data set was analyzed using SPSS. Negatively worded items were reverse coded in the summations of the conceptual perception domain. Summated means and standard deviations were calculated for the composite score of the overall attitude of elementary teachers toward the integration of agriculture and the total number of agricultural awareness activities conducted. Stepwise multiple linear regression statistics were used to analyze the data. Categorical independent variables were dummy coded. Relationships were described using the Pearson product-moment coefficient. Means and standard deviations were reported with each coefficient. The alpha level was established *a priori* at .05.

Results

Ninety percent (n = 274) of the teachers were female and 10 percent were male (n = 27). Sixty-two percent (n = 171) of the teachers had a bachelor's degree and thirty-eight percent (n = 103) of the teachers had a master's degree. The grade levels taught by the elementary teachers were 38% for kindergarten through second grade and 62% for third to sixth grades. The years of teaching experience of the teachers in the sample were evenly distributed among the categories of teaching experience. Thirty-nine elementary teachers (14%) had taken agricultural classes, workshops, or in-service programs. One hundred fifty-six elementary teachers (57%) had agricultural experience. Half of the teachers (n = 136) in the sample taught in rural community; one-fourth (n = 67) taught in a metropolitan community; and one-fourth (n = 67) taught in an urban community. Many teachers taught more than one grade level and more than one subject. Elementary teachers had positive perceptions regarding integrating agriculture into the elementary curriculum. The Integration of Agriculture domain represented 14 items related to the integration of agriculture into the elementary curriculum, e.g., agriculture would enhance the curriculum; there is no time to teach agriculture in the elementary curricula; agriculture can be taught in any subject matter area; and, elementary school teachers are not trained to teach agriculture (Knobloch & Martin, 2000a). The mean of this domain was 3.74 (SD = 0.44). Two hundred twenty-eight teachers (81%) indicated that they had conducted agricultural activities in their instruction at least once during the school year. In general, elementary teachers conducted 40 agricultural awareness activities in their curriculum during the school year reported. Some examples of the activities were recycled paper and discussed renewable resources; discussed an agricultural issue about the environment; viewed birds or wildlife; identified types of trees in a forest; and, identified the ingredients from a food label.

In a prior study (Knobloch & Martin, 2000b), relationships between four selected demographic characteristics and the elementary teachers' perception of integrating agriculture domain were found to be significant with the number of agricultural awareness activities conducted (Table 1). The four demographic characteristics (Degree, Grade Level (K-2), Agricultural Classes, and Agricultural Experience) and the perception of integrating agriculture domain (Integration Perception) were entered into a stepwise, multiple linear regression model (Table 2). The full model was significant (p=.032) excluding the independent variable—Degree. Integration Perception accounted for 7.8% unique variance, Grade Level (K-2) accounted for 4.0% unique variance, Agricultural Classes accounted for 2.4% unique variance, and Agricultural Experience accounted for 1.4% unique variance. An examination of the residuals showed the assumptions were not violated. Furthermore, there was no concern of multicollinearity (Lowest tolerance factor=.928; Highest VIF=1.07).

Table 1. Summary Data: Regression of Number of Agricultural Awareness Activities Conducted on Selected Characteristics of Elementary Teachers (N = 261)

Variables	Intercorrelations							
	X_1	X_2	X_3	X_4	X_5	Y_1	*M*	*SD*
Degree of Education (X_1)	1.00	.06	.13	-.06	.03	.13	.36	.48
Grades Level[1] (X_2)		1.00	-.01	-.05	.15	.24	.38	.49
Agricultural Classes[2] (X_3)			1.00	.09	.15	.21	.14	.35
Ag. Experience[3] (X_4)				1.00	.17	.18	.57	.50
Integration Perception (X_5)					1.00	.36	3.74	.44
Activities Conducted (Y_1)						1.00	39.54	22.40

Note. The perception scale for X_5: 1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly agree.
[1]Grade Level: 0 = Grades 3-6; 1 = Grades K-2
[2]Agricultural Classes & [3]Agricultural Experience: 0 = No; 1 = Yes

Table 2. Summary of Stepwise Regression Analysis for Variables Explaining Agricultural Awareness Activities Conducted by Elementary Teachers (N = 261)

Variables	Full Model				
	B	*SE B*	*B*	*T*	*p*
Integration Perception	14.82	2.96	.29	5.01	<.01
Grades Level[1]	9.25	2.59	.20	3.58	<.01
Agricultural Classes[2]	10.10	3.62	.16	2.79	<.01
Agricultural Experience[3]	5.52	2.56	.12	2.16	.03
(Constant)	-24.09				

Note. Full Model: R^2 = .21; *Adjusted* R^2 = .20; F = 16.81; p=.032
[1]Grade Level: 0 = Grades 3-6; 1 = Grades K-2
[2]Agricultural Classes & [3]Agricultural Experience: 0 = No; 1 = Yes

Conclusions and Recommendations

Elementary teachers in this study had positive perceptions towards integrating agriculture into their pedagogy and curriculum. This finding supported the recommendation that agriculture should be integrated in the elementary curriculum (Birkenholz, Frick, Gardner, & Machtmes, 1994; DeChristopher, 1993; Dewey, 1938; Frick, Birkenholz, & Machtmes, 1995; Leising & Zilbert, 1994; Lynch, 1999; National Council for Agricultural Education, 1999; National Research Council, 1988; Terry, Herring, & Larke, 1992; Trexler, Johnson, & Heinze, 2000). The regression model supported Fishbein and Ajzen's (1975) theory, which supports the implication that elementary teachers with positive beliefs about the consequences of integrating agriculture leads to positive attitudes and subjective norms, thus, leading to intentions and behaviors of integrating agriculture into their instruction. Therefore, the elementary teachers' positive perception of the integration of agriculture in their curriculum and pedagogy tenably explained why many teachers conducted agricultural activities in their instruction.

The characteristics of elementary teachers that explained 20% of the variance of the number of agricultural activities conducted in the elementary curriculum were their perceptions toward integration, if they taught grades K-2, if they had taken agricultural classes or workshops, and if they had agricultural experience. The finding that elementary teachers with positive perceptions of integrating agriculture in their curriculum were more likely to conduct agricultural activities in their classrooms supported research conducted by Rudd and Hillison (1995), who found that teachers' attitudes related to the amount of new curriculum that was taught. Elementary teachers' perceptions toward integration was the most significant variable explaining the extent which agricultural activities were integrated into the curriculum. Further, elementary teachers who taught in the lower grade levels were more likely to integrate agriculture in their instruction was consistent with Trexler, Johnson, and Heize (2000) and Lynch (1999a). The finding that teachers who have participated in agricultural classes, workshops, or intervention education programs was consistent with the findings of Balschweid, Thompson, and Cole (1998), Trexler and Suvedi (1998), and Trexler, Johnson, and Heinze (2000). Moreover, the finding that agricultural experience contributed to teachers more likely to integrating agriculture in their instruction related to Humphrey, Stewart, and Lindhardt's (1994) conclusion that teachers with agricultural experience were more confident in teaching agriculture.

The findings and conclusions of this study should be considered in the development of intervention programs for pre-service and in-service teachers by teacher education programs, agriculture teachers, and state department of education consultants. Using the regression equation from this study, it can be predicted that elementary teachers in east central Iowa with a positive perception towards integration, K-2 teaching involvement, participation in agricultural-related classes or workshops, and agricultural experience would conduct approximately 60 agricultural activities in their curriculum and instruction in an academic year (Estimated Number of Agricultural Activities = -24.09 + (14.82)(Perception) + (9.25)(K-2 Teacher) + (10.10)(Ag. Class) + (5.52)(Ag. Experience). Moreover, commodity organizations, agricultural promotion groups, and elementary education programs such as Agriculture in the Classroom and Food, Land, and People should consider the conclusions of this study in developing resources and programs that elementary teachers need and use in integrating agriculture into their curriculum. For example, these organizations and groups should collaborate with agricultural educators, such

as professors and state specialists, who are experts in agricultural awareness and literacy in developing agricultural in-service education and experience programs, especially targeted to improve the perception toward integration of elementary teachers who teach in the lower elementary grades.

This study should be replicated in other states to determine if the findings vary because of geographical differences, economic changes and societal influences. This study should also be conducted to measure the changes in attitudes and behaviors after an intervention program related to agricultural awareness or agricultural literacy has been implemented. Further, data should be collected to assess how elementary teachers believe that agriculture could be best integrated into their instruction, especially in grade 3 or higher. A factor analysis of the instrument should be investigated. Future research studies should be conducted to identify barriers to integrating agriculture into the elementary curriculum and to explain student achievement associated with the integration of agriculture in the elementary curriculum.

References

American Farm Bureau Federation. (1998). Farm facts for the record. Retrieved February 14, 2000 from the World Wide Web: http://www.fb.org/today/farmfacts/ftr.html

Babbie, E. (1990). Survey Research Methods. Belmont, CA: Wadsworth Publishing Company.

Baily, T. & Hughes, K. (1999). The prospects for work-based learning. CenterWork, 10(3-4), 17.

Balschweid, M. A., Thompson, G. W., & Cole, R. L. (1998). The effects of an agricultural literacy treatment on participating K-12 teachers and their curricula. Journal of Agricultural Education, 39(4), 1-10.

Birkenholz, R. , Frick, M., Gardner, H., & Machtmes, K. (1994). Rural and urban inner-city school student knowledge and perception of agriculture. Proceedings of the Twenty-First National Agricultural Education Research Meeting, 130-136.

Bottoms, G. (1998). Things that matter most in improving student learning. Atlanta, GA: Southern Regional Education Board.

Bottoms, G., & Presson, A. (2000). Finishing the job: Improving the achievement of vocational students. Atlanta, GA: Southern Regional Education Board.

DeChristopher, R. (1993, November 13). Where does food come from? Iowa FarmerToday. p. 15.

Dewey, J. (1938). Experience and Education. New York: Collier Books.

Fasheh, M. (1990). Community education: To reclaim and transform what has been made invisible. Harvard Educational Review, 60(1), 19-35.

Fishbein, M., & Azjen, I. (1975). Belief, attitude, intention, and behavior: An introduction to theory and research. Reading, MS: Addison-Wesley Publishing Company.

Frick, M., Birkenholz. R., & Machtmes, K. (1995). Rural and urban adult knowledge and perceptions of agriculture. Journal of Agricultural Education, 36(2), 44-53.

Fox. L. (1932). Agriculture in the grades. Virginia Journal of Education, 25, 272-274.

Grubb, W. N. (1999). Keeping the faith: The prospects for "education through occupations." CenterWork, 10(3-4), 13.

Harris, C. R., & Birkenholz, R. J. (1996). Agricultural literacy of Missouri secondary school educators. Journal of Agricultural Education, 37(2), 63-71.

Herr, R. D. (1968). Instruction in agriculture for elementary school students. The Agricultural Education Magazine, 41(4), 96-97.

Herren, R. V., & Oakley, P. (1995). An evaluation of Georgia's agricultural in the classroom program. Journal of Agricultural Education, 36(4), 26-31.

Hoachlander, G. (1999). More than a name change? Transitioning from vocational to career and technical education. CenterWork, 10(3-4), 2-4.

Humphrey, J. K., Stewart, B. R., & Linhardt, R. E. (1994). Preservice elementary education majors' knowledge of and perceptions toward agriculture. Journal of Agricultural Education, 35(2), 27-30.

Kaufman, P., Bradby, D., & Teitelbaum, P. (2000). High Schools That Work and whole school reform: Raising academic achievement of vocational completers through the reform of school practice. Berkeley, CA: National Center for Research in Vocational Education University of California

Keenan, R. G. (1970). Teaching elementary pupils about agriculture. The Agricultural Education Magazine, 43(4), 90-91.

Kerlinger, F. N. (1973). Foundations of behavioral research. New York: Holt, Rinehart, and Winston.

Knobloch, N. A. (1997). Perceptions regarding integration of agricultural awareness activities by elementary teachers in east central Iowa. Unpublished master's thesis, Iowa State University, Ames.

Knobloch, N. A., & Martin, R. A. (1998). Perceptions regarding integration of agricultural awareness activities into the curriculum by elementary teachers. Proceedings of the Twenty-Fifth National Agricultural Education Research Meeting, 385-396.

Knobloch, N. A., & Martin, R. A. (2000a). Agricultural awareness activities and their integration into the curriculum as perceived by elementary teachers. Journal of Agricultural Education, 41(4), 15-26.

Knobloch, N. A., & Martin, R. A. (2000b). Relationships of elementary teachers' perceptions and activities conducted regarding the integration of agricultural awareness activities into the curriculum. Proceedings of the Twenty-Seventh National Agricultural Education Research Meeting, 207-219.

Leising, J., & Zilbert, E. (1994). Validation of the California agriculture literacy framework. Proceeding of the Twenty-First National Agricultural Education Research Meeting, 112-119.

Lucht, G. (1993, November 20). Classroom education replacing advertising. Iowa Farmer Today. pp. 14-15.

Lynch, R. L. (1999a). A vision of high school career and technical education for the 21st century. Unpublished manuscript.

Lynch, R. L. (1999b). Response: More than a name change? CenterWork, 10(3-4), 6.

Mawby, R. G. (1984, May). Agriculture colleges must take the lead in ending ignorance about farming. The Chronicle of Higher Education. p. 72.

Miller, L. & Smith, K. (1983). Handling nonresponse issues. Journal of Extension, 21(S/O), 45.

National Council for Agricultural Education. (1999). A new era in agriculture: Reinventing agricultural education for the year 2020. Alexandria, VA: Author.

National Research Council. (1988). Understanding Agriculture: New Directions for Education. Washington, DC: National Academy Press.

Newcomb, L. H., McCracken, J. D., & Warmbrod, J. R. (1993). Methods of Teaching Agriculture. Danville, IL: Interstate Printers and Publishers.

Newmann, F. M., & Wehlage, G. G. (1995). Successful school restructuring: A report to the public and educators by the Center on Organization and Restructuring of Schools. Madison, WI: Center on Organization and Restructuring of Schools.

Nunnally, J. C. (1967). Psychometric Theory. New York: McGraw-Hill.

Rudd, R. D., & Hillison, J. H. (1995). Teacher characteristics related to the adoption of agriscience curriculum in Virginia middle school agricultural education programs. Journal of Agricultural Education, 36(2), 19-27.

Shively, W. H. (1936). Teaching objective for agriculture in the elementary schools. The Agricultural Education Magazine, 8(7), 101, 103.

Snowden, O. L., & Shoemake, R. G. (1973). Elementary programs fro career education in agriculture. The Agricultural Education Magazine, 45(7), 149-150, 153.

Southern Regional Education Board. (1999). Making Schools Work: Raising Student Achievement in Rural Middle Grades and High Schools. Atlanta, GA: Author.

Swan, M. D., & Donaldson, G. W. (1970). The agricultural educator's role in helping elementary pupils learn about agriculture. The Agricultural Education Magazine, 42(11), 282-283.

Terry, R., Jr., Herring, D. R., & Larke, A., Jr. (1992). Assistance needed for elementary teachers in Texas to implement programs of agricultural literacy. Journal of Agricultural Education, 33(2), 51-60.

Trexler, C. J., Johnson, T., & Heinze, K. (2000). Elementary and middle school teacher ideas about the agri-food system and their evaluation of agri-system stakeholders' suggestions for education. Journal of Agricultural Education, 41(1), 30-38.

Trexler, C. J., & Suvedi, M. (1998). Perception of agriculture as a context for elementary science teaching: A case of change in Sanilac County, Michigan. Journal of Agricultural Education, 39(4), 28-36.

White, C. D., Stewart, B. R., & Linhardt, R. E. (1991). Career opportunities in agriculture as perceived by inner city high school students. Journal of Agricultural Education, 31(1), 30-34.

U. S. Department of Education. (1999). Key high school reform strategies: An overview of research findings. Washington, D. C.: Office of Vocational and Adult Education. Retrieved November 4, 2000 from the World Wide Web: http://www.ed.gov/offices/OVAE/nahs/research.html

Characteristics of Elementary Teachers Explaining Integration of Agricultural Awareness Activities in the Curriculum

A Critique

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The authors are commended for the use of an array of literature to create an extensive conceptual framework for this and previous investigations. Knowledge of the nature, background, beliefs, and activities of the elementary teachers is foundational if agricultural literacy program leaders are to develop effective inservice programs that result in effective classroom activities that eventually lead to informed student actions.

A variety of questions surface as one carefully reads through the paper. First of all, considering that this study is an extension of earlier research efforts, talk about what prevented the authors from incorporating related theory, findings, conclusions, and recommendations from earlier articles into the conceptual framework, conclusions and recommendations of this study.

Equally important, perhaps, is the need for and inclusion of a brief synthesis of the literature regarding the criteria used by all teachers when selecting elements of their curricula. More specifically, what does the literature reveal about the factors that contribute to teacher selection of instructional topics and activities for all instructional areas? Does it also have to do with stage of teacher development, background, levels of formal and informal education, years teaching the courses, educational philosophy, state standards, occupational experience, nature and instructional approaches of textbooks and instructional materials, meaningful employment experiences, and other factors?

What do the researchers believe accounts for the remainder of the unexplained variance in this study? Does it solely have to do with the Dewey's philosophy, integration and/or contextual learning? If not, what are the implications for research and practice?

And finally, will "...experiencing or exploring agriculture as it relates to the subject matter studied or context of life being lived; the ability to identify the connections of agriculture to identify the connections of agriculture to areas of study or life (agricultural awareness) ..." result in an adequate level of awareness and appreciation of the food, fiber, and natural resources industries? Or, are there other strategies that contribute to greater levels of student awareness and appreciation. Can and should we learn from the students of the teachers involved in this study and students from teachers who have not been part of programmatic agricultural awareness interventions.

The researchers are commended for carefully examining this topic. The profession looks forward to additional scholarship regarding the characteristics and activities of teachers and how they contribute to the integration of agriculture in elementary classrooms.

STAKEHOLDER PERCEPTIONS OF THEIR TRANSITION TO AN AGRICULTURAL MAGNET SCHOOL IN THE MIDWEST: A CASE STUDY

Entry Vignette

Agriculture is one of the nation's most valued treasures, yet it is so misunderstood. An elementary student was asked what corn was used for. The student responded by saying, "...to feed the squirrels" (Hellerich, 1998). For others, agriculture is nostalgic. We may have grown up on a farm or ranch or spent vacation on grandma and grandpa's farm. We may remember those times as simple and carefree. We may have gathered eggs, pulled weeds in the garden, slopped the hogs, went fishing in the afternoons and had homemade ice cream on the porch at sunset. For others, agriculture is cows and plows. Nothing more than hard, backbreaking work where profit margins are small. We may have seen a neighbor, friend or even parents lose the "family farm" in poor economic times. I wonder as folks drive across the Midwest on I-80 if they are amazed by and ponder the technology being used in today's agriculture or if they are bored to tears at the flat, ever-slowly changing scenery. Thinking all the while, "why would anyone live here and how would they make a living". If these are accurate perceptions of agriculture – why are agricultural education programs and student enrollment increasing?

Introduction

Why an agricultural magnet school? The more important question, why not an agricultural magnet school? During the mid-80's, a national study of secondary agricultural education called for reform (Understanding Agriculture, 1988). Agricultural education programs across the country were seeing declining student enrollments. An exception was in urban public schools where the agricultural education programs were thriving. The difference was the curriculum. The urban agriculture curriculum consisted of floriculture, landscaping, marketing, food science, leadership, aquaculture, natural resources and companion animals to name a few (Understanding Agriculture, 1988). These large urban schools offered agriculture as a theme or a magnet to their school.

The magnet school concept was created in the early 70's "primarily as an aid in desegregating schools" (Inger, 1991). Magnet schools became a choice for parents and students (Waldrip, 1998). Mitchell (1989) described ten success factors of exemplary magnet schools including: (1) a safe and orderly environment, (2) a businesslike attitude, (3) a warm and caring school climate, (4) a student-friendly admission process, (5) a dual mission of preparing students for career and college, (6) high student expectations, (7) an industry based curriculum, (8) the integration of theory and practice, (9) strong links with business and industry and local higher education institutions, and (10) leadership from the principal.

A magnet school was not necessarily defined by the demographics of its student body, as in the case of current agricultural magnet schools (NEA Research, 1998). Rather, a magnet school was defined by the academic subject area it emphasized (Dentler, 1991). Magnet schools have been created in the areas of performing arts, technology, and fine arts. Why would a rural school district want to emphasize agriculture enough to implement an agricultural magnet school concept?

Purpose

The purpose of this single case study was to explore stakeholder perceptions of a rural Midwestern school's transition to an agricultural magnet school. Data were collected through semi-structured interviews with two administrators, four faculty members, two school board members, two student council representatives, observations, and a review of school documents related to the transition. For the purpose of this study, a magnet school was defined as a "public school offering a distinctive curriculum with a unique district purpose for voluntary desegregation, allowing for school choice and access to students beyond a district attendance zone" (Dentler, 1991).

"Grand Tour" Question

What process did one Midwestern secondary school use to change its educational structure? Educational structure was described as the curriculum (Senge, et al., 2000) and leadership exerted by administrators and faculty.

Procedures

This was a qualitative research study, specifically a single case study bounded by time, subject matter, and location (Creswell, 1994). The purpose was to collect the voices and stories of key stakeholders of a Midwest public secondary school implementing an agricultural magnet school. Data collection included conducting a maximum of eight, semi-structured interviews and collecting school documents, observations, and newspaper stories. Two researchers spent time before, during, and after school observing the environment of the school, describing the physical appearance of the school facilities, and monitoring the behavior of students moving to and from classes, the presence of faculty in the school, and the interaction of the administrators, faculty, staff, and students. These were unobtrusive observations. These observations assisted the researchers in describing the setting (i.e. physical, social, etc.) of the school. Audio-taped interviews were transcribed. After transcription, all audio-tapes were destroyed. Data collected, i.e. transcriptions and documents, will be kept for a maximum of two years in a locked file cabinet.

Qualitative data analysis was conducted (Tesch, 1989). The researchers read the transcripts identifying commonalities and themes. After the initial steps of data analysis, the researchers looked for emerging themes and consolidated the larger picture of the change process used in implementing an agricultural magnet school. Finally, the researchers looked for "patterns" illustrating rival explanations, supporting existing change theory and magnet school theory, and/or building theory. To gain internal validity, triangulation was used. Triangulation used multiple sources, specifically, multiple methods (interviews and document review), multiple investigators (two faculty members), and member checks (Creswell, 1994). The researchers left a clear audit trail of all transactions associated with this case study.

Findings

The Setting

Why would a school district known for its academic and athletic excellence consider changing its educational structure by adding a magnet school? It may be helpful to first know a little about the community and school. The school is located within a half-hour drive from three urban communities. Two of these communities have a population over 100,000 people. It is in close proximity to the Land Grant University's Agricultural Research and Development Center (ARDC). The ARDC occupies 10,000 tax-free acres in the school district. Production agriculture is the main source of income of this district with a growing number of bedroom commuters. Predominant agronomic crops grown are irrigated corn and soybeans. Livestock enterprises consist of cattle and swine. Sheep are raised on small acreages. Increased activity in added-value cropping ventures is occurring as well. A large-scale turf grass production company is located in the community. Local businesses include a convenience store, gas stations, bar, bank, and farmers cooperative. Religion and family values are important in this small rural community. The school and its activities are the "hub" of the community.

There are approximately 160 students enrolled in grades 9-12. The school is known for its athletic and academic prowess. All stakeholders describe the school as a "strong college prep program where it is not unusual to have several students graduating a year with ACT scores over 30". The school's agricultural education program is well known nationally for state and national FFA officers as well as state and national public speakers. A former teacher described the agricultural education program as "strong in production agriculture" with a "history of agricultural leadership".

Sense of Urgency

'Survival' was the issue. The board of education and administrators were faced with budget cuts as well as a declining student enrollment. One school administrator summed up the situation,

> "Two years ago we were looking at having to make $180,000 in cuts to stay within the lid....with the farm economy being where it was at we saw no option, we had to cut $180,000 from our budget which was about 2.75 teachers in total. For us with about 160 kids (that) was pretty serious cuts. We lost one whole department...we've lost flexibility in scheduling."

People in the community were concerned about their survival as a small school in terms of financial considerations. Teachers were concerned about losing their jobs. Parents were concerned about sending their children to schools that may not have the same high academic standards. "Education has always been very important to the people in this community. It was important that we look at that in trying to keep the school open," explained a school board member.

Several saw that an "opportunity" was presented to work collaboratively with the ARDC to help "keep students in Nebraska" and involved in the agricultural industry. An administrator

explained, "the main goal in terms of the district was to provide an agricultural education program for our students that would prepare them to go into the immediate agriculture industry. The secondary goal was to keep the school open."

The Change Process

The magnet school concept was first discussed when the ARDC met with school officials about a biotechnology workshop. On the agenda was an item about "incorporating the ARDC into the school." During the discussion, a school board member brought up the idea of an agricultural magnet school. "Everyone chuckled" and said, "yeah, right". The idea did not die. One teacher described his involvement in planning for an agricultural magnet school as the "desire to be on the cutting edge". A board member commented, "even though agricultural production is the basis of agriculture, the majority of our kids graduating from school will not be in production agriculture." Yet the USDA reports that industry demand is high for agricultural scientists/researchers; marketing and distribution; horticulture; and agribusiness (Goecker, Gilmore, & Whatley, 1999). There are not enough college graduates to fill positions in these career areas.

The school district and ARDC were granted seed money from Nebraska Network 21, a Kellogg – sponsored university grant, to study the feasibility of creating an agricultural magnet school (NN21 News, 1998). The relationship between the school and the land grant institution began several years prior to the period of this research with a demonstration project. This project involved the integration of agricultural examples to explain science principles at the middle school level. This demonstration project was financially supported by NN21. This connection provided experience for the school leadership in recruiting support and cooperation from outside of the school organization.

Through NN21, grant administrators, board members, teachers and students visited existing agricultural magnet schools and non-traditional agricultural education programs as well as attended national conferences on educational reform efforts. An administrator explained that the agricultural magnet school development occurred in three phases: phase 1, brainstorming; phase 2, what is reality; and phase 3, implementation. During the 1998-99 school year, a student interest inventory was conducted. From this interest inventory, career clusters were identified. The four career clusters included agricultural technology, plant science, agribusiness, and food science. A planning task force committee, which consisted of board members, teachers, students, administrators, and a variety of university personnel, designed the curriculum.

Career clusters and required course work were planned and will be implemented in 2-3 years. All students will take the following agriculture courses: ninth graders take a semester course in agricultural literacy; tenth graders take an entrepreneurship in agriculture course; and students in their junior and senior years specialize in one or more of the career cluster tracks listed earlier. (The school district was beginning the implementation phase at the time of data collection.) During spring registration, the agricultural magnet school concept and student requirements were explained to parents and students. Curriculum starting in fall 2000 included the agricultural literacy course and food science career cluster. At this same time, school facility enhancements included the addition of a stand-alone greenhouse.

Guiding Coalition

This was an involved, educational, structural change in a small rural school. Several groups and individuals have been involved as a means of ensuring success. One of the administrators shared that "we all have to agree on the vision". The following describes the guiding coalition and their contributions.

ARDC – Agricultural Research and Development Center
- Biotechnology workshop
- Suggested "agricultural magnet school"
- Provide faculty and facilities

School Board
- Initial meeting with ARDC
- Approval of "agricultural magnet school" concept
- "Encouragement and financial support"
- Continue to meet with coalition members

Agricultural Businesses and Industry
- Internships for students
- Funding for facilities and curriculum

Administration
- Facilitate process
- Communicate and articulate process
- Provide resources, i.e. release time

Faculty
- Planning task force committee members
- Write and implement curriculum
- Articulate new program to students and parents

Students
- Serve on planning task force
- Discuss agricultural magnet school opportunities with peers

University and State Department of Education Agricultural Education Staff
- Support and encouragement
- Technical information
- NN21 support

Discussion

School as Learning Organization

Fullan (1993) purported that if schools are to change, the learning climate must change and that it must begin with the principal. The principal must be a designer, steward, and teacher. This small rural school was fortunate to have a highly energetic principal who was 100% behind the agricultural magnet school. Fullan (1993) defined the designer as one who "learns what they need to learn, not what someone else thinks they need to learn". The principal provided teacher-release time to work not only on the magnet school curriculum, but also time to complete other

school-related tasks. Also, the principal placed great value in faculty and student abilities. The principal placed teachers and students in leadership roles. Fullan (1993) described the role of steward as "one who could see their own personal vision as part of something larger". The principal in the steward's role, "asked the hard questions" at the beginning. After learning what the expectations were of the board and superintendent and feeling comfortable with an agricultural magnet school concept, the principal "bought into" the program. It became the personal mission of the principal for the school to excel "in implementing the magnet school". Fullan (1993) described the role of 'principal as teacher' as the ability to have systemic understanding. As teacher, the principal read, observed, and participated in conferences learning as much as possible about magnet schools, what they were and were not. The principal assisted the task force in visualizing what their agricultural magnet school would and would not be. A concern shared by all stakeholders was what would happen if the principal left. It was felt by all that the principal served as the catalyst. Stakeholders believe the next 3-5 years are critical for the success and continuation of the magnet school.

The teachers had an increased leadership role in implementing the agricultural magnet school. With the reduction of an existing program and reducing the number of teachers by 2.75, teachers in this school system have been placed in leadership roles. The teacher was seen as leader and collaborator. Teachers served on teams responsible for specific outcomes in planning and implementing the agricultural magnet school. At first, teachers questioned the priority and significance of their own programs. Through discussions and learning more about a magnet school concept, teachers learned their own programs would be enhanced.

Fullan (1993) stated that an organization might be susceptible to "group think" and "balkanization" (sub-cultures). It appeared that faculty, students, parents, and the community bought into the agricultural magnet school concept. Communication and collaboration were used to come to consensus, rather than defaulting to coercive measures. If there was a coercive factor, it may have been economics and the community's fear of not being able to maintain its identity through their school. Stakeholders had a realistic view of the situation and looked at several alternatives. Through shared decision-making, the agricultural magnet school concept was chosen as the best possible solution. Change was reality; this school district chose to become proactive.

4 Core Capacities in Individual Change Agentry

Fullan (1993) identified and discussed the importance of personal vision building, inquiry, mastery, and collaboration in individual change agentry. These four core capacities were evident when listening to stakeholders describe the process of implementing an agricultural magnet school into their existing school structure.

Stakeholders came to the same conclusion due to their ability to share what they valued. Each valued living in a "small rural community", they had a belief in agriculture and felt a necessity to keep 'kids' in the state. Therefore, it was a succinct decision to proceed with the magnet school. Most stakeholders expressed concern about growth attributable to students from outside the district. This growth might result in the infusion of students that do not share the community's values. But the school board was willing to go ahead.

Inquiry was described as the ability to continually ask questions and seek new knowledge. Stakeholders were able to simultaneously express and extend what they valued through several activities. They were involved in brainstorming activities and individual study. All possible questions were asked. Various stakeholder groups were involved in attending and participating in professional conventions as well as visiting cutting-edge agricultural education programs.

Fullan (1993) described mastery as continually clarifying what is important as well as seeing current reality more clearly. Learning becomes a habit and those involved know where new ideas fit and become skilled at them. Stakeholders met monthly to discuss what had been discovered since the last meeting. They shared ideas in both short and long term growth. The task force committee was in the process of final stages of the implementation plan and was preparing curriculum and facility plans for school year 2000-2001.

> Collaboration must be at the smallest unit as well as the largest unit. The district itself consisted of a task force of students, teachers, board members, and administrators. At the largest scale, the administration involved the ARDC, state department of education and the university. This was a 'grass roots' movement, yet administration had the foresight to involve others outside of the school district boundaries to provide insight in their expertise.

Interpretation and Recommendations

Adding to or modifying an existing educational structure can be demanding as well as taxing on a school's stakeholders and resources. Successful change is dependent on several factors and those factors are different for every school. What worked best for this school district may not work for the next. Several key factors were clear. They were succinct values, involvement of all, collaboration, communication, leadership, availability of resources, and a shared vision and subsequent planning and implementation of an action plan.

It was difficult to designate one individual as the leader. All stakeholders demonstrated leadership. Granted, the roles of the stakeholders may have elicited some of the leadership demonstrated. Servgiovanni and Starratt (1993) believe change that counts alters basic issues of schooling such as goals, values, beliefs, working arrangements, and the distribution of power and authority. It was evident this school district was using shared decision-making.

Knoster's (1991) discussion of "managing complex change" illustrated that for change to occur five components must be in place: vision, skills, incentives, resources, and an action plan. All of these were in place. Due to communication efforts, a shared vision was established. Stakeholders were able to travel to 'model' agricultural education programs and magnet schools as well as attend professional meetings. Incentive may have first been directed by fear of losing their school. Because of the vision of the agricultural magnet school, the incentive shifted to being "cutting edge" and to enhancing current academic programming efforts. This school district was fortunate to receive external funding or "seed money". Future plans include grant writing and seeking the help of business and industry to fund internship and limited facility expansion. Another key resource was the 10,000 acres operated by the ARDC. Students and

teachers had access to the faculty and research facilities to enhance the agriculture curriculum. An action plan was in place and actively being pursued. This included curriculum as well as facility improvements.

Why an agricultural magnet school? It was obvious. Agriculture was an economic base in the community. Historically, it had played an active role in the community and the school. Challenging career opportunities were available with the agricultural industry. As one board member explained,

> "...encouraged us to raise our sights higher and to not just educate. Not just get them (our students) through high school, but to equip them in whatever field ... not just be average or mediocre, but be above average and thereby be more of a success themselves. (To) always feel their high school education was worthwhile".

Recommendations

Based on the findings of this study, and correlated to the change theory process, the following recommendations are offered.

1. Sense of urgency. The change process as described by Potter (1995) begins with a sense of urgency. In this case, the sense of urgency is created from both external and internal stimuli. The internal stimulus emanated from personal core values whereas the external stimulus emanated from the impacts or potential impacts of the surrounding environment (Yukl, 1998). The stimulus interaction created the sense of urgency that is a physiological reaction to the fear and insecurity of the unknown. In the case of this study, the internal stimulus of urgency was the prospect of losing control of educational autonomy and excellence, a sense of identity obtained through educational achievement, and employment security. The external stimuli driving this insecurity were declining student enrollments and government encouragement toward school unification or merger.

To prompt change, a sense of urgency must be created. In the case of the community, urgency will prompt change if attached to core values. It is the recommendation of these researchers that the first step in community change is to define the core values. This can be accomplished through a series of community meetings during which verbal and non-verbal communication clarifies the sense of urgency and reassures values through a community vision.

2. Community vision. A community vision requires leadership that empowers those affected to have input in the decisions creating the ultimate vision. Yukl (1998) describes such leadership:

> ...the process wherein an individual member of a group or organization influences the interpretation of events, the choice of objectives and strategies, the organization of work activities, the motivation of people to achieve the objectives, the maintenance of cooperative relationships, the development of skills and confidence by members, and the enlistment of support and cooperation from people outside the group organization. (p. 5)

Such was the case in this study. Although it was difficult to designate one person as the leader, the administration and school board employed a strategy allowing those most drastically affected to be involved in the gathering of information and decision-making. This involvement removed or subdued possible insecurity.

3. Communication. A third recommendation is constant communication articulating the vision of change. This reiteration removes possible obstacles of doubt that may surface as the organization proceeds through unchartered waters. The sense of insecurity is replaced with one of security borne out of others' approval. The establishment of a coalition of those directly involved in the change, as well as those outside of the organization, can broaden the stakeholder base. This support strengthens individuals' ability to address the unknown change. In this study, the school organization meets monthly to report on progress and to identify areas of concern.

4. Program planning and evaluation. A fourth recommendation is to implement program planning including viable evaluation. Stakeholders are cautioned to not be caught up in the growing excitement for implementation and default to a poorly designed or ill-conceived program planning model. A key facet of program planning evaluation received little or no mention by stakeholders. Without strong program evaluations this change strategy for rural communities may be seen as non-replicable and very contextual in nature. Further, without an evaluation component, funders may be wary and turn away. As well, without evaluation how will anyone, including the stakeholders and their constituents, know the effectiveness of the implemented programs.

Closing vignette

What lies in the future of this small rural agricultural community and its school? When you visit with most stakeholders "it's a bright future". They foresee a resident high school where students from within and outside the state attend not only for its high academic programs but because of its agriculture curriculum and internship opportunities. The future program will move from a single teacher department to 4-6 agricultural education teachers. The curriculum may still include production agriculture but will emphasize science and research, management, engineering, public relations, marketing and distribution, horticulture and food science. Students will have internships with Fortune 500 companies that will offset their college tuition. Fiction? Not hardly, when one observes the enthusiasm of those involved.

> A sophomore student upon returning from a visit to the Chicago School of Agricultural Sciences excitedly tells his mom that he will be registering for agricultural classes in the fall. "Mom, agriculture is more than farming, did you know I could have a career in chemical sales…did you know there are even ag lawyers? This ag magnet thing is cool. Did you know, I will have the opportunity for a summer internship with someone like ConAgra and they may even pay for my college education!"

References

Creswell, J.W. (1994). Research design: qualitative and quantitative approaches. Thousand Oaks, CA: Sage Publishing.

Dentler, R.A. (1991). The national evidence on magnet schools. Occasional paper series. Los Alamitos, CA: Southwest Regional Laboratory for Educational Research and Development. (Eric Abstract ED335780).

Fullan, M. (1993). Change forces. New York: The Falmer Press.

Goecker, Glimore, & Whatley. (1999). Employment opportunities for college graduates in the food and agricultural sciences: agriculture, natural resources and veterinary sciences, 2000-2005. United States Department of Agriculture and the Purdue University School of Agriculture. http://faeis.tamu.edu/supplydemand/home.htm

Hellerich, E. (1998). Personal conversation. Ag In the Classroom Coordinator. Nebraska Farm Bureau Federation, Lincoln, NE.

Inger, M. (1991, August). Improving urban education with magnet schools. ERIC Clearinghouse on Urban Education. (Digest number 76: EDO-UD-91-6)

Kotter, J.P. (1998). Successful change and the force that drives it. In G.R. Hickman (Ed.), Leading organizations: perspectives for a new era. Thousand Oaks, CA: Sage Publications, Inc.

Knoster, T. (1991). Managing complex change. TASH Conference. Washington D.C.

Mitchell, V., Russell, E.S., & Benson, C.S. (1989). Exemplary urban career-oriented secondary school programs. Berkeley: National Center for Research in Vocational Education. (ERIC Abstract, ED 312502)

Partnerships melt away perceived barriers as biotechnology demonstration project takes off. (1998, winter). NN21 News. 2(1) 1.

Senge, P., Cabron-McCabe, N., Lucas, T., Smith, B., Dutton, J., & Kleiner, A. (2000). Schools that learn. New York: Double Day.

Servgiovanni, T.J. & Starratt, R.J. (1993). Supervision: a redefinition (5th ed.) New York: McGraw Hill, Inc.

Status of public education in rural areas and small towns: a comparative analysis. (1998, September). Prepared by National Education Association. On-line. http://www.nea.org/publiced/rural.html

Tesch, R. (1989). Qualitative research: analysis types and software tools. London: Falmer Press.

Understanding agriculture: new directions for education. (1988). Committee on Agricultural Education in Secondary Schools, Board on Agriculture, National Research Council. Washington D.C.: National Academy of Sciences.

Waldrip, D.R. (1998). A brief history and philosophy of magnet schools. Magnet Schools of America. On-line: http://www.magnet.edu/history.html.

Yukl, G.A. (1998). Leadership in organizations, (4th ed). Upper Saddle River, New Jersey: Prentice Hall.

Stakeholder Perceptions of Their Transition to an Agricultural Magnet School in the Midwest: A Case Study

A Critique

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Agricultural education practitioners and researchers must be participants in proven and innovative approaches to delivering programs that meet current and emerging needs. The purpose of the study was to explore the perceptions of stakeholders of a rural Midwestern school's transition to an agricultural magnet school. A variety of interviews, unobtrusive observations, and document analyses within this retrospective study were used to "...collect the voices and stories of key stakeholders of a Midwest public secondary school implementing an agricultural magnet school...". More specifically, the study sought to describe the process the school used to change its educational structure.

Numerous questions arise from this paper that may merit discussion among colleagues. For example, in addition to the theory(ies) presented in this paper, what other contemporary theories of change are appropriate for directing and explaining the process of reconceptualizing the structure of local schools and agricultural education programs. Which, if any, of these theories were used to inform the initial process? Who directed the school through the process? How was the process used in the case study similar and dissimilar to other program planning models used by agricultural and career and technical education practitioners and researchers?

Considering that the purpose of this qualitative study was to collect the voices and stories of the participants, discuss the rationale for not disclosing some of the memorable and informative statements from each of the audiences that were used to identify commonalties and themes. How were the perceptions of the various audiences similar and dissimilar? How did the biases of the researchers affect the findings and interpretations? How were the voices of students not interested in an agricultural magnet school integrated into the process, findings, and outcomes of the transition? Talk about the rationale and practice used of separating the themes in the findings section from the topics of learning organization and four core capacities in individual change agentry in the discussion section.

With respect to the theories of change, which theory or theories provided the greatest guidance for understanding and guiding the Midwestern school's transition to a magnet school. Elaborate on how this study supported or refuted the theory that informed its conceptual framework and design. What specific recommendations do you have for the corresponding practitioner and research audiences involved in the case study experience?

The researchers are commended for carefully examining the process and supporting theories that informed one school as it transitioned to a magnet school. It appears many schools across the United States can value from well-designed studies and documented reports that outline key considerations and processes in changing their structure and curricula. The profession looks forward to further scholarship regarding these important topics and lines of inquiry!

EXPERT PERCEPTIONS OF THE FUTURE OF AGRICULTURAL EDUCATION IN ILLINOIS

Introduction

Agricultural education is an ever-evolving discipline. Past and current subjects continue to call for examination, while new issues and topics are being incorporated into agricultural education research. This high volume of potential research areas related to agricultural education requires that some way of prioritizing these issues needs to be implemented. It is critical that research reflects current and future needs of agricultural education. This study makes an effort to identify and prioritize future agricultural education research needs in the state of Illinois.

Research in agricultural education has been subject to scrutiny. Buriak and Shinn (1993) noted a perception that agricultural education research lacks direction and is "soft and not systematic". Similarly, Silva-Guerrero (1990) identified multiple descriptions of agricultural education research as "too shallow to develop essential understandings, focused on ancillary areas, and often unrelated to what is already known." Another concern is that agricultural education research is often determined by state and federal funding agencies (Mannebach 1981), not by professionally determined needs, and thereby priority is not necessarily given to the most appropriate research endeavors. As the field of agricultural education evolves at a rapid pace, responding to this change is a primary concern for agricultural education research (Herring 1995). Warmbrod (1986) states "our highest priority for continuing progress in research in agricultural education must be that we pay greater attention to the significance and importance of the problems and issues that we research."

Identifying and prioritizing research initiatives is an issue agricultural education researchers have examined. Buriak and Shinn (1989) suggest that opinions of experts in the agriculture industry can provide valuable focus and direction for agricultural education research efforts. Silva-Guerrero and Sutphin (1990) submitted a five-point Lickert scale questionnaire to experts across the nation to determine the level of priority of specific research topics. In another study, Buriak and Shinn (1989) used a four-phase Delphi approach to identify and measure what experts perceived as the level of research need in areas related to agricultural education on a national level. They found such topics as identifying innovative instructional technologies, identifying science content of contemporary agriculture programs, and improving evaluation of agriculture teachers to be of concern. Connors (1998) also used a Delphi approach to identify perceptions of members of professional agricultural education organizations on critical issues facing secondary education programs. This study identified funding local agriculture programs and recruitment and retention of secondary agriculture teachers as two extremely important issues. These national studies provided a basis for similar research at the state level and served as models for incorporating the Delphi approach within the state of Illinois. The need for incorporating the perceptions of experts into a research agenda for agricultural education research in Illinois was the basis for this study.

The purpose of the research project was to investigate the perceptions of experts in agricultural education concerning the future of Agricultural Education programs in Illinois. This research project was designed to determine the future issues and concerns, research priorities, proposed

impacts, ongoing limitations, major accomplishments and future competency areas for agricultural education programs in Illinois.

This research project was supported by a grant developed by the Facilitating Coordination in Agricultural Education (FCAE) project staff. This project was funded by the Illinois State Board of Education and supported by the Agricultural Experiment Station of the University of Illinois at Urbana-Champaign. The expected outcome of this research project was to provide input to establish a cooperative university agricultural education research plan for Illinois.

Objectives

The overall goal of this research project was to ascertain Agricultural Education expert opinions and perceptions of the future of Agricultural Education programs in Illinois. The specific research questions for this research project were to determine:

1. What are expert opinions and perceptions of future issues and concerns facing Agricultural Education in Illinois?

2. What should be the future research priorities for Agricultural Education in Illinois?

3. What impacts should Agricultural Education Programs have on students the agricultural industry, and communities in Illinois?

4. What are the ongoing limitations that have kept Illinois Agricultural Education programs from meeting the needs of students, the agricultural industry, and communities?

5. What do Agricultural Education exerts perceive as being the major significant accomplishments achieved through Illinois Agricultural Education programs the past ten years?

6. What future competency areas should be researched in order for Illinois Agricultural Education programs to provide for instruction in the food, fiber, environmental and natural resource system?

Methods and Procedures

The method of data collection for this investigation was the use of a modified Delphi technique. The Delphi technique was originally developed by the Rand Corporation in order to ascertain expert opinions related to future issues.

A research steering committee was established to structure the investigation. The committee was composed of ten professionals representing agricultural education teachers, university faculty, community college faculty and state level agricultural education leaders in Illinois. The committee met to determine the open-ended questions for the first round of the Delphi instrumentation and a list of experts for the investigation. The committee identified twenty-three "experts" in Illinois representing state leadership, teacher educators, secondary level teachers,

community college teachers, and the agriculture industry for agricultural education. The primary nomination criterion was the extent to which the person was considered an "expert" on Agricultural Education programs in Illinois.

The first stage of the Delphi technique was to ask a panel of experts a series of open-ended questions for their candid responses. The questions used for the Delphi survey were developed by the research steering committee of ten research advisors selected for this project. The first round Delphi instrument was composed of six open-ended questions. Nineteen of the initial twenty-three participants returned the completed round one instrument.

Based upon the first round of the Delphi survey, a complete list of all items was complied for each of the six questions. A second instrument was mailed to each participant for each to assess their individual level of agreement as to whether the items were significant. Those items that two-thirds of the participants indicated that they either "agreed" or "strongly agreed" with were included in the next round of instrumentation. Seventeen participants returned the completed second round instrument. A third and final round of the Delphi instrument was used to gain consensus of the items that more than two-thirds of the participants believed that they agreed that the item was significant. Sixteen participants completed the third and final round of the Delphi.

The reliability of a Delphi study is considered to be greater 0.80 if there are thirteen or more participants. The final composite listings of the participants' responses comprise the findings of this investigation. The items found to be in consensus are perceived to be significant expert opinions.

Findings

The first research question was to determine expert opinions of future issues and concerns facing Agricultural Education in Illinois. Listed below in table 1 are the composite findings of the Delphi study participants when asked to describe the future issues or concerns facing Agricultural Education in Illinois. These issues reflect a consensus of the experts and are not ranked based on relative importance.

The perceptions of the experts indicate that the majority of the issues identified were directly related to providing effective instruction. These included items such as recruiting, preparing and retaining effective teachers. Several issues related to agricultural literacy were also identified. The experts indicated several issues related to expanding the public's perception about agriculture were significant.

Table 1: Expert opinions of the future issues or concerns facing Agricultural Education in Illinois.

1. Adequately trained teachers.
2. Expand the general public's perception of agriculture to be more than farming. (Defining agriculture to everyone.)
3. Recruiting good people to teach.
4. The number of schools that have agriculture education programs.
5. The integration of technology.
6. Identifying the types of jobs that will be available for future agriculturists.
7. The types of skills needed for future agriculture instructors.
8. Working with the non-agriculture part of society for a better understanding of modern agriculture.
9. A service organization to provide educational materials, and support.
10. Maintaining an agriculture education presence with the Illinois State Board of Education.
11. Sufficient funding to meet program needs.
12. Competitive teacher salaries with agriculture industry.
13. Agriculture teacher retention.
14. Promotion of agriculture careers.
15. The need for instructional programs, as well as agriculture literacy in grades K-8.
16. Professionalism.
17. Expansion of the public understanding, addressing food safety and environmental areas.

The second research question was to determine expert opinions of future research priorities for Agricultural Education in Illinois. Listed below in table 2 are the composite, unranked findings of the Delphi study participants when asked to describe the future research priorities for Agricultural Education in Illinois.

The panel of experts was able to develop a list of nineteen future research priorities for Agricultural Education in Illinois. The research priorities can be classified into two broad categories. One category of priorities was related to effective teaching and educational program planning and delivery methods. The need to research and develop new instructional materials and teaching strategies are included in this area. The other category was related the effects and impacts of agricultural education instructional activities such as the FFA and SAE (Supervised Agricultural Experience).

Table 2: Expert opinions of the future research priorities for Agricultural Education in Illinois.

1. Effects of BSAA and PSAA* on student achievement in other lab courses, success in college.
2. New curriculum requirements in secondary and post-secondary education.
3. How much local school counselors really know about the total agriculture industry field and the opportunities for young people.
4. Determine effective methods of teaching agricultural literacy.
5. Benefits received by funding secondary agriculture programs.
6. Cost vs. benefits of secondary agriculture education programs.
7. The benefits of SAE (Supervised Agricultural Experience).
8. What qualities will agriculture employers want in their future employees?
9. How to improve agriculture education enrollments at all education levels.
10. The importance and focus of post-secondary education.
11. Models for teacher recruitment and retention.
12. Alternative funding sources.
13. Determining how much traditional agriculture is still needed in the future agriculture education program.
14. How to integrate agriculture into all areas of curriculum?
15. Technology and the Internet.
16. Does membership in FFA significantly improve achievement?
17. Does SAE programs significantly improve achievement?
18. The impact of secondary agriculture programs on career success and college success.
19. The impact of agriculture literacy programs at the elementary level on the perceptions children have towards agriculture.

*BSAA and PSAA Biological and Physical Science Applications In Agriculture

The third research question was to determine expert opinions of what impacts should Agricultural Education programs have on students, the agricultural industry, and communities in Illinois. Listed below in table 3 are the composite, unranked findings of the Delphi study participants when asked to describe the impacts of Agricultural Education programs in Illinois.

The panel of experts derived an extensive listing of the impacts that they felt Agricultural Education programs should be providing in Illinois. The twenty-eight suggested impacts can be

classified into three areas impacting careers, communities, and personal development of agricultural education students.

Table 3: Expert opinions of what impacts should Agricultural Education programs have on students, the agricultural industry, and communities in Illinois.

1. Focus on leadership development through the FFA.
2. Establish the foundation for critical thinking and problem solving skills.
3. Provide agriculture experiences for students planning to enroll in a college of agriculture and or planning to enter an agricultural occupation.
4. Provide students with opportunities to learn everything they can and give the experiences that will have a lasting impact.
5. Provide the agriculture industry with qualified employees that understand the agriculture industry and the "global picture".
6. Agriculture education programs should instill in all students a sense of community pride.
7.
8. Training competent, confident individuals that are prepared to enter the workforce.
9. Supply what skills industry needs.
10. Become more involved with industry to understand their needs.
11. Actively involved with their respective communities.
12. Be able to articulate positions and communicate with all.
13. Improving agriculture literacy levels within each community.
14. Develop life skills.
15. Promote economic development.
16. Promote/engage in global economy.
17. Impact industry leadership.
18. Promote education beyond secondary level.
19. Provide strong connections for students with industries and communities.
20. Promote "pre K-life" concept of agriculture education (life-long learning).
21. Determine what the agriculture careers are in the changing agriculture industry.
22. Provide opportunities for all to develop leadership, gain agriculture literacy, and pursue successful careers in agriculture related fields.
23. Continue to ask help from FFA alumni chapters to help run programs.

24. Teach the students to be proactive.

25. Provide all students with basic understanding of the sources of food and fiber as well as what is involved in getting them to the consumer.

26. Create a positive attitude in the general public toward the economic benefits and contributions of the field of agriculture.

27. Development of education partnerships in communities.

28. Help to broaden the view of what agriculture really is.

29. Positive attitude or view of agriculture for everyone.

The fourth research question was to determine expert opinions of the ongoing limitations that have kept Illinois Agricultural Education programs from meeting the needs of students, the agriculture industry, and communities. Listed below in table 4 are the composite, unranked findings of the Delphi study participants when asked to describe the ongoing limitations facing Agricultural Education in Illinois.

The majority of the limitations cited by the panel of experts were related to the perceived lack of understanding of Agricultural Education programs and the nature and scope of the agriculture industry.

Table 4: Expert perceptions of the ongoing limitations that have kept Illinois Agricultural Education programs from meeting the needs of students, the agriculture industry, and communities.

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1. Financial resources.
2. Low priority of state leaders: industry, government, and education.
3. Perceived narrow focus of agriculture education.
4. Misunderstanding of what the agricultural industry includes.
5. Information from the State of Illinois agencies indicating little need for agriculture employees.
6. Counselors misunderstanding of the jobs available in agriculture.
7. Teachers not understanding the application of science, math, etc in the real world of agriculture.
8. School administrators who do not understand the role of agriculture.
9. Negative perception of agriculture as a career on the part of the parent, guidance counselors, and the general public.
10. Low financial rewards for teaching, especially at the secondary level.

11. Finding and keeping dedicated, competent, effective agriculture teachers.

The fifth research question was to determine expert opinions concerning the major significant accomplishments achieved through Illinois Agricultural Education programs the past ten years. Listed below in table 5 are the composite, unranked findings of the Delphi study participants when asked to describe the major accomplishments of Agricultural Education in Illinois.

The items identified by the experts indicate that most of the perceived accomplishments are related to improving and expanding Agricultural Education programs. The emphasis of the accomplishments is related to the development of new curriculum and instructional materials for agricultural education.

Section 5: Expert perceptions of the major significant accomplishments achieved through Illinois Agricultural Education programs the past ten years.

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1. Establishment of FCAE, ILCAE, and ICAE*.
2. By expanding horticulture and non-traditional subjects to the curricula.
3. Better in-services for teachers.
4. Funding for programs.
5. Core curriculum (updates too).
6. Rejuvenation of agriculture programs to attract new, more diverse students.
7. Increased legislative efforts for agriculture literacy.
8. Agriculture literacy efforts.
9. Significant changes made in course offerings...less production, more emphasis on today's agriculture.
10. Science credit for agriculture classes.
11. Major universities accepting Biological and Physical Science (BSAA and PSAA) classes for laboratory science entrance credit university wide.
12. Revised program focus on industry needs.
13. Line item funding for agriculture education.

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*Facilitating Coordination in Agricultural Education, Illinois Leadership Council for Agricultural Education, Illinois Committee for Agricultural Education

The sixth and final research question was to determine expert opinions of future competency areas should be researched in order for Illinois Agricultural Education programs to provide for instruction in the food, fiber, environmental and natural resource system. Listed below in table 6

are the composite, unranked findings of the Delphi study participants when asked to describe the future competency areas for Agricultural Education in Illinois.

The future competency areas identified by the panel can be divided into two broad categories. One category of items was related to the development and advancement of innovative technologies in the curriculum such as biotechnology and communications technologies. The other category of items was related to the expansion of the curriculum including items related marketing, sciences, and non-traditional instructional content areas.

Table 6: Expert perceptions of future competency areas should be researched in order for Illinois Agricultural Education programs to provide for instruction in the food, fiber, environmental and natural resource system.

1. Technology skills.
2. Organization and management.
3. Science based curriculum.
4. Global focus.
5. Environmental integration.
6. Entrepreneurial focus and integration.
7. Current and relevant mechanical and technical skills.
8. Marketing skills.
9. Natural resource and environmental curriculum.
10. Better prepared agricultural education instructors. (less time spent in general education courses, more in subject areas).
11. E-commerce and how it will affect the agricultural economy.
12. Biotechnology and its implications for the agricultural industry.
13. Economics taught in agriculture terms similar to BSAA and PSAA.
14. Understanding the impact and ramifications of genetic technology.
15. Expansion of horticulture.
16. Continue to address sales and service areas.
17. Be positive about changes and learn how to adopt to change.
18. Career awareness.
19. Food science and food technology.
20. Small animals and other non-traditional courses.
21. GMO education.

22. Promote diverse populations into agriculture.

23. Teacher training in specific areas.

24. Precision agriculture management.

25. What agriculture skills are needed for agriculture occupations in urban areas

26. How to further develop more basic math and science concepts in agriculture.

27. More emphasis on problem solving techniques of teaching.

28. Teach integrity via selecting and recruiting good people to teach.

Implications

The overall goal of this research project was to ascertain Agricultural Education expert opinions and perceptions of the future of Agricultural Education programs in Illinois. In general the experts perceived that there are a variety of future issues and concerns facing Agricultural Education in Illinois. Many of the findings of this research effort indicate the need to develop innovative curricula and improve the planning and delivery of agricultural education programs.

The panel of experts appeared to place emphasis upon improving Agricultural Education curricula through the advancement of technologies and addressing changes in agriculture industry. The need for recruiting, preparing and retaining qualified teachers was also emphasized, which reflects similar findings to those of Connors (1998). Many of the future issues and impacts for Agricultural Education were related to preparing students to meet the needs of a changing industry. This panel of experts placed emphasis upon providing students with the knowledge and skills to be able to succeed in a science, communications, and technology-based future for the agriculture industry.

The panel of experts also placed emphasis upon the need for efforts to provide research and instructional activities related to agricultural literacy. It appears as though the experts believed that the general public is going to play an increasing role in the future of Agricultural Education in Illinois. Furthermore, Agricultural Education needs to reach beyond the traditional audiences and address the needs of a more diverse society.

Based upon the findings of the research project a cooperative effort developed a series of research priorities for Agricultural Education in Illinois. These priorities were developed by the research planning committee that designed the original nature and scope of this research project. The following research priorities have been implemented into a five-year research program for Agricultural Education in Illinois.

1. Determine the effects of Biological and Physical Science Applications in Agriculture (BSAA, PSAA) curricula on student achievement in other lab courses, success in college, etc. and major universities accepting these classes for lab science entrance credit university wide.

2. Assess the impact of curriculum changes including the expansion of secondary Agricultural Education programs inclusion of horticultural and non-traditional subjects to the curriculum and their impact on the changing of the agricultural industry.

3. Determine the impacts of teacher in-service activities, including teacher retention, teaching quality, and Agricultural Education program quality in Illinois.

4. Determine the impact of the Secondary Incentive Funding grants from the Illinois Agricultural Education line item over the past twelve years on the quality of the local Agricultural Education programs in Illinois.

5. Determine the impact of Agricultural Literacy efforts on the secondary agricultural education enrollment in Illinois over the past twelve years.

6. Assess the impacts of Agricultural Literacy programs in Illinois at the elementary/junior high levels on the perception children have toward the agricultural industry.

7. Determine the impacts of the Illinois Agricultural Education infrastructure including, Facilitating Coordination in Agricultural Education (FCAE), Illinois Leadership Council for Agricultural Education (ILCAE), Illinois Committee for Agricultural Education (ICAE), and the Illinois State Board of Education (ISBE) on educational initiatives in Illinois.

The long-range goals of these priorities are to improve and enhance Agricultural Education programs and activities in Illinois through a cooperative research effort.

References

Buriak, P. and Shinn, G. C. (1993). Structuring research for agricultural education: a national Delphi involving internal experts. The Journal of Agricultural Education, 34(2), 31-36.

Buriak, P. and Shinn, G. C. (1989). Mission, initiatives, and obstacles to research in agricultural education: a national Delphi using external decision makers. The Journal of Agricultural Education, 30(4), 14-23.

Connors, J. (1998). A regional Delphi study of the perceptions of NVATA, NASAE, and AAAE members on critical issues facing secondary agricultural education programs. The Journal of Agricultural Education, 39(1), 37-47.

Herring, D.R. (1995). Managing change in agricultural education. The Agricultural Education Magazine. 67(8), 7-8,22.

Mannebach, A. (1981). Priorities for research in agricultural education. Proceedings of the National Agricultural Education Research Meeting. Atlanta, GA.

Silva-Guerrero, L. and Sutphin, H. D. (1990). Priorities for research in Agricultural Education. The Journal of Agricultural Education. 31(3), 1-13.

Warmbrod, J.R. (1986). Priorities for continuing progress in research in agricultural education. A paper presented at the 35th Annual Southern Region Research conference in Agricultural Education. March. North Little Rock, AR.

Expert Perceptions of the Future of Agricultural Education in Illinois

A Critique

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The researchers conducted a sound qualitative study using the modified Delphi technique. This study is a good example of how qualitative research should be conducted and reported. The researchers could have developed a questionnaire to acquire the needed information but the Delphi technique was more appropriate since the researchers were interested in achieving consensus on the future of agricultural education in Illinois from the identified experts in the field. This research also built upon previous Delphi studies in agricultural education. The purpose and objectives for the study were clearly identified. The Delphi technique is not new but more information on what a modified Delphi technique encompasses would have been helpful. How does the modified Delphi technique differ from the original Delphi technique?

Methods and procedures were clearly stated. The researchers began the first stage of the Delphi with six open-ended questions then followed up with a second instrument that was a Likert-type scale. The participants then had the opportunity to state their level of agreement with the items. The authors indicated the reliability of this Delphi study was considered to be greater than .80 if there were thirteen or more participants; this statistic has no citation.

The findings would have been more meaningful if the items were ranked according to the extent of the agreement with each item. After the third round of the Delphi, the researchers could have reported the percentage of agreement for each item then ranked that item. Another possible method to rank the items would have been to use the interquartile range for each statement. The interquartile range identifies the middle 50% of the responses for each statement so it is the distance between the first and third quartiles. However, the researchers would have had to ask the participants to rank items in order to determine the interquartile range. Generally, a high interquartile range score indicates a wide variance of opinion in positioning in the ranked items. In this study the researchers indicated that consensus was achieved when "more than two-thirds of the participants agreed that the item was significant." If the items would have been ranked, would that have changed the research priorities that were based upon this study?

In tables one through six it is interesting to note that certain topics keep reoccurring. Those topics are technology, agricultural literacy, and the broadening of what agriculture really encompasses. These items alone are areas where researchers in agricultural education could make a difference for the profession. Once again, the need to reach out beyond the traditional audiences and capture the needs of a more diverse society would appear to strengthen the role of agricultural education in the future.

LEADING LIKE A WOMAN IN A MAN'S WORLD: WOMEN'S CONCEPTUALIZATIONS OF LEADERSHIP IN THE AGRICULTURAL INDUSTRY

Introduction

In the United States, men have historically chosen to build their lives around agriculture, while their women (wives and children) have assisted, worked alongside, and supported them (Tevis, 1995). In the U. S. it has only been in the last century—notably beginning during WWII and then onward through the decades—that women have taken independent roles in the agricultural industry (Tevis, 1995; Wells & Tanner, 1994).

With this addition of women to the workforce, a new workplace environment within the agricultural industry has presumably been created. New methods of leadership and agricultural practices combined with recognition of alternative forms of agriculture (i.e. sustainable agriculture, community-supported farms) can be attributed to women's voices. While many women have chosen to involve themselves with the alternative sides of agriculture (organic farming, sustainable agriculture, direct marketing) (Hassanein, 1997; Hassanein, 1999; Sachs, 1996; Sternweis & Wells, 1992; Wells & Tanner, 1994; Wells, 1998) not all agricultural women have. At the onset of this research efforts were made to determine what place women hold in the traditional structure. It was initially found that "women in agriculture" meant women on governmental support programs. This was bothersome because it meant women were only consumers of the industry, not producers or suppliers. However, it was eventually found that women hold small places in the traditional structure (Hassanein, 1999; Tevis, 1995) as independent operators of farms women comprise 6% of the total 1.9 million farms in America, and women as joint operators comprised 23% of that total (Perry & Ahearn, 1994, p. 24).

Even though women are involved in agriculture, they are usually invisible (Sachs, 1996). Because traditional stereotypic beliefs that women should remain in the home, or on her farm are alive and well in agriculture (Hassanein, 1999; Wells & Tanner, 1994) many women believe when they venture out of the home or off the farm they must work harder and longer than their male counterparts to succeed (Baxter & Hoover, 1992; Hewitt, 1991; Owen, 1986; Sturnick, 1999). Although women have been involved in agricultural work, much of their work is volunteer and/or part of a male-female team effort (Hassanein, 1999; Perry & Ahearn, 1994). This is changing though. The United States Department of Agriculture National Agricultural Statistics Service reported a 12% increase in the number of women operating farms, the numbers have risen from 145,156 in 1992, to 165,102 in 1997 (NASS, 1999).

In other areas of the agricultural industry specifically academia, women are concentrated in Agricultural Education and Extension education at 12.5% (Henderson & Cooper, 1987, p. 16). Henderson and Cooper (1987) also found that in the most agricultural regions of the country (IA, IL, IN, KS, MI, MN, MO, ND, NE, OH, SD, WI, AL, AR, FL, GA, KY, LA, MS, NC, OK, SC, TN, TX, VI) (p. 16) there were the least number of women scientists in the respective colleges of agriculture. The low numbers of women scientists may additionally be harmful to young women who search for role models, mentors, or counselors to help them break into the agricultural

industry. Moreover, this problem not only leads to a biased field, but also perpetuates the situation (Baxter & Cooper, 1992).

While the exact numbers of women in production agriculture are difficult to surmise, the abilities and opportunities for farm women to take active roles in organizing and leading political movements during times of farm crisis, are particularly high (Miller & Neth, 1988). Miller and Neth (1988) found that it was during the farm crisis of the 1980's that farmwomen stepped into the political and organizational arena because they were "sick of what's happening to their families and... farms" (p. 375). Instead of depending on husbands and other men to share their voices and solutions, women are now being seen as possible leaders of agricultural reform.

> Highly motivated farmwomen have turned the farm crisis into a learning and developmental opportunity... they are making the transition from supportive and organization-building roles ... to a voice of their own (Miller & Neth, 1988, p. 378).

However, after their years of leading at the community level, women are still rarely found leading at the national or even state level (Miller & Neth, 1988; Sachs, 1996).

An obstacle facing women's acceptance and advancement within the agricultural industry, is the difference between men and women's leadership and communication styles. In the situation where the ratio is skewed–where there is a large majority and a small minority, or a few women in agricultural leadership–women may feel that using male discourse or methods are the only way to survive in the field (Long, 1998). This is a problem because men and women are said to communicate and view the world differently (Gilligan, 1980; Helgesen, 1990). To date, men have built structures and organizations that are "separate, dominating, and hierarchical" (Bem, 1993) in both practice and discourse. However, because women tend to see the world as a series of interconnected relationships and events, they are more likely to build organizations or environments that are "connected, mutually empowering, and harmonious"(Bem, 1993, p. 128). Thus, male and female communication and leadership tendencies are not only different, but seem to be polar opposites.

"Women's traits behaviors, attitudes, and socialization are said to make them inappropriate or deficient as managers..." (Morrison & Von Glinow, 1997, p. 524). The traditional supposition that men are agentic or "independent, masterful, assertive and competent" and that women are communal or "friendly, unselfish, concerned with others, and emotionally expressive" (Eagly & Karau, 1991, p. 686) carry heavy implications when studying leadership (Hegstrom, 1992). Because leaders are conceived of as persons who are in charge of managing and leading people and/or groups (Berdahl, 1996; Rosener, 1995), to be a leader has traditionally implied being male (Clark, Carafella, & Ingram, 1998; Kolb, 1997). Since agriculture in the United States has been considered men's work, these "great man" theories and expectations that leadership would come from men is particularly relevant (Burns, 1978; Sachs, 1996).

Alternative to the male model of leadership is women's view that the world is a series of complex relationships (Loden, 1985). As a result women often make their choices based on the effect that their decisions will have on others (Clark, Carafella, & Ingram, 1998; Kolb, 1997),

whereas men primarily make choices based on logic (Gilligan, 1982). Helgesen (1990) found women view leadership as a web of relationships, this relates, in part, to the way they make decisions (Clark, Carafella, & Ingram, 1998). The basic premise of "web leadership" is that any tug or movement on any part of the web can be felt by all other components of the web. In addition, the women in Helgesen's study viewed their leadership positions as being in the center of the web, rather than being on top of the organizational pyramid. With this image of center comes a different view, as feeling and sharing are very different from the traditional model of one man on top, in charge, leading the way for all to follow (Helgesen, 1990; Romano, 1996; Rosener, 1990; Rosener, 1995).

Because the concept of leadership is fluid and changing based on the situation and the group's the abilities and characteristics, the leader also needs to be adaptable (Gardner, 1990; Kouzes & Posner, 1995). With the expansion of the world's economy, and the speed of change, leaders are called on to "be social initiators, anticipate problems and possible solutions, build alliance, bring people together, and develop networks" (Bennis, 1993, p. 98). This statement suggests a positive shift, for women, in the leadership paradigm and the ensuing requirements for leaders. Women's ways of leading may just be the style needed to compete in this new millennium (Book, 1998).

In summary, the basis of this discussion is best stated by Rosner (1995) "we should concentrate on appreciating the gender differences rather than arguing about their origins" (p. 65). Bennis (1993) echoed her suggestion when he stated that failure to embrace and uphold other's uniqueness will "dangerously skew" (p. 101) perspectives. Therefore, as the agricultural industry becomes more diverse with the addition of women, understanding women's past and current place in agriculture is of import for those seeking to capitalize on or foster the specialized skills of women.

Purpose and Objective

The purpose of this study was to explore women's ways of leading in the agricultural industry. The objective of the study was to determine their conceptualizations of leadership, and to share their stories about how they have achieved leadership titles and how they lead in those capacities.

Method

Patton (1990) stated that inductive research involves the researcher's attempts to make sense of a situation without "imposing preexisting expectations on the phenomenon" (p. 44). Furthermore, Schwandt (1994) has explained that people's realities are based on their ability to engage in dialogue with each other, and on their relationships with one another. Additionally, Lincoln and Guba (1985) suggested that the phenomena under study are only understandable when studied in the "natural" context (p. 189). Therefore, recognizing each woman's individuality and the necessity of studying their contexts, the qualitative paradigm was chosen to guide this study.

One tenant of qualitative methodology is the study of the case. This allows for an in-depth view of specific phenomena. Through purposive sampling techniques, cases are chosen for either representativeness of the norm, or for their deviation from it. I selected women who were representatives of both categories. These five women were selected based on their leadership

titles, personality characteristics, and their current careers. Irwin (1995) explained in her study of transformational women leaders, that cases studies of women leaders are particularly important because

> they provide examples of what transformational leadership actually looks like, insights into the qualities of individuals who are leaders, an understanding of struggles to achieve empowerment, and finally vicarious experiences... through stories or narratives (p. 11).

From this case study I developed grounded theories based on the women's narratives. Glaser and Strauss (1967) posited the viewpoint that grounded theory—theories gleaned from data—provide "relevant predictions, explanations, interpretations, and applications" (p. 1). They further contended that inductive theories derived from data are more applicable than deductive theories, to situations that are similar in nature. In addition, because theory comes directly from data "laymen involved in the area to which the theory applies will usually be able to understand it..."(Glaser & Strauss, 1967, p. 3-4).

Data were gathered by interviewing each participant twice and by twice observing them in their places of work. Following fieldwork data tapes were transcribed, then coded thematically, and finally compared to themes found in other comparative female leadership studies (Helgesen, 1990; Rosener, 1995; Sinclair, 1998). Guba and Lincoln (1989) stated that credible interpretivist research seeks to "match between the constructed realities of respondents and those realities as represented by the evaluator [researcher]" (p.237). The credibility or internal validity of this study lies in the triangulated research process. Repeated engagement, multiple research techniques, and an open and continued dialogue between myself and the women concerning my analysis of them individually and collectively contributed to a fluid and refined match between their actuality and my analysis of their reality. One of the themes we explored were the ways these women lead.

Findings

Rosener (1990/1995) and Helgesen (1990) explained women's leadership styles to be web-like or communal. They suggested that women lead through sharing power and decision making with constituents. It was found that the women in this study reached out to their constituents to include them in the leadership or work processes. These women weren't concerned with personal gain or methods of leading, in fact, many of them told me that they didn't think of themselves as leaders and that to them leadership was a non-issue, just something they do. However, in observing and talking with them, it was observed that they all paid particular attention to the needs of those they work with. They sought to listen, to include, to show, and to help others.

Farmer Kay expressed that to her leadership is "just doing what I do... I don't see myself as a leader but I know I am cuz' when I don't show up things run amuck..." (interview, 8-7-00). However, when she is in leadership positions, she seeks to do "what is right, not just for me, but good for everybody" (interview, 8-7-00). In a side conversation with her husband, he explained that: "she just gets a hold of something and won't let it go until she gets her way" (interview, 8-

7-00). While some might call this stubbornness, she defines it as a "passion or something that burns inside me" (interview, 8-7-00, 8-21-00).

Although she is a mother, wife, activist, and involved in agriculture, she leads by including people into her circle. As she moved from home to work and other places around town, she reached out to people and made them a part of her world by talked with them about their lives, problems, and ideas (observation, 8-7-00, 8-21-00). Whether it was talking with a neighbor on the phone or talking with strangers at a public meeting, she included them in her circle of action. Her attention to and concern with all these different people may be because she views life as "a big spider web. If we wiggle something over here, it jiggles over there" (interview, 8-21-00) or maybe because she realizes that when she is trying to change a system or get votes, each person, no matter class or station in life, still counts. Her leadership is not about power and status; rather, it is a responsibility that comes with her commitment to improving and preserving the agricultural way of life for her children.

Agribusiness Alice leads by example and dedication to serving the customer. She first classified herself saying: "I'm not any better…but the guys are lost when I'm not here, it irks me…" (interview, 7-17-00). Alice has been proving herself as a woman and as a foreigner since the day she interviewed for her job, being a Midwestern transplant to the desert-agricultural west the rural businessmen were leery of hiring an outsider. Through hard work (heavy manual labor in very dirty conditions), long hours (about 14 a day), and quality work performance (doing more than the average and paying attention to details like cleanliness of the work environment), she has worked her way up the managerial ladder.

Her ascension to the top, though, has been about more than just work. Many of her employees have been unwilling and unaccustomed to working under a woman's direction. Although she is the boss, who sets the rules and procedures, she still has to work with and through the rebellious attitudes of many of her employees. To do this, she has developed a lead-by-example philosophy. She developed this philosophy from observing past managers and bosses, and more importantly from customers. She commented that it is "frustrating to see the guys just standing there, they see our [her and other managers] example and they still stand" (interview, 7-17-00).

In her situation, she reaches out to the customer making him/her feel that they are number one. Even though "the boys" are frustrating, she refuses to "crack the whip" (interview, 7-17-00), because she is a people-pleaser. She works hard to make sure that in her "web" her fellow employees are okay, and that the work environment runs smoothly. In her leadership position, she calms the waters and often sacrifices her own time and wants for a peaceful work environment and happy customers.

Political Maria was similar to Alice in that she worked primarily with men who were unaccustomed to women as agriculturalists or leaders. An elected official, she has used her knowledge of agricultural systems to fight for her voters. Although she is in a powerful position, she is still a lone woman playing in a field of powerful men. She shared that her success has come from being "firm, not shrill, [and by not] giving up or swaying" (interview, 8-3-00). In her experience she has found that "by being prepared and by knowing what you're talking about, people will sway… the worst possible thing you can do [as a woman] is to open your mouth and

not have something substantial come out or to get shrill" (interview, 8-3-00). She shared a recent experience that further illuminates these thoughts:

> At a recent agricultural field day one of the guys that was there from a seed company turned around to me and said "Mrs. _____ how long has it been since you've been on a farm?" He never would have asked if I had been Mr._____. I smiled very sweetly and said, "Yesterday." He got the message. It's one of those things that is always there under the surface (interview, 9-12-00).

She has gained leadership positions by being determined and diligent in overcoming the men in her field, "by gender I'm non-traditional, not by training. I've just got damn mad when they've told me I couldn't... I have absolute dogged determination and I won't give up... I won't quit!" (interview, 8-3-00). These qualities have won the confidence of the men because they now feel like she is their advocate. Moreover, she has come to the point in her life and leadership career, that she feels it's time to minimalize the differences rather than emphasize them. She told me

> I think it's time to get over it. It never ends. For your purposes and paper I will tell you that when I give a speech I try to minimalize it. I'm recognized as being the Ag leader, someone who stands their ground for Ag (interview, 9-12-00).

Although she attempts to minimize references to her sex, she agrees that her sex and agricultural knowledge have been important in her leadership/power negotiations with men. She notes that these negotiations and experiences have shaped and molded her into the politician she is today. Because of (a) men's expectations of her as a woman, (b) traditional agricultural ways, and (c) her learning and working step for step with them in their traditional agricultural fields (cattle production, real-estate brokering, agricultural land and machinery appraisal and most recently agricultural policy) she has shown them that she is a competent leader. Yet, her strength is not just from her elected power, but rather, much of her strength is a result of working in the industry with agricultural people. Thus much of her power or understanding comes from the way her leadership web was woven.

She has worked as an agriculturist; she worked with farmers who's businesses went bankrupt during the farm crisis; she counseled those same farmers and their families and worked with the courts for agricultural land settlements; and through personal agricultural pursuits she has experienced the woes of the agriculturists who she now represents and serves. In fact, it was her feeling that someone needed to go to Congress and tell it what was really going on in agriculture. She somehow became that someone.

Her story of becoming the person to solve the problem is very characteristic of how she leads. "I've always been a leader or sought leadership roles, I've naturally gravitated toward leadership positions" (interview, 9-12-00). Interesting to note is that while she does conceptualize of herself as a leader she also attributes much of her success to "the stars, [which] have always lined up for [her]" (interview, 9-12-00). She does follow this cosmic explanation with admitting that she did bring "skills that get recognized, appreciated and used" (interview, 9-12-00). Yet, she follows this acquiescence with stating that leadership opportunities just "fell in my lap... I took advantage of those opportunities as they presented themselves. Lots of people have skills I have,

[they just] haven't been able to capitalize on them" (interview, 9-12-00). Even though she is humble in describing her leadership skills she remains deeply rooted in her agricultural background, and in doing what's right. She shared with me that she

> ...would never do anything that would disrupt the fabric of my family. And second I'm not going to do anything I can't live with. It's not that important to me. I don't care because what is important to me is that I feel good about myself and my family (interview, 9-12-00).

Although she enjoys politics and playing its games, it is also a strong commitment to her fellow agriculturists that makes her leader. In an effort to reach out to them and make their lives better, she is also becoming what they feel is "their woman" (observation, 8-11-00).

Academic Sarah reaches out to her constituents by listening to them. She likes to be proactive rather than reactive in her leadership. "I like to listen to concerns and problems then find solutions and work within the system" (interview, 8-3-00). One of her assignments was to prepare a press release concerning the community and state benefits of accepting a new chicken feeding facility. Not a chicken expert, she called faculty members and asked for their personal and scholarly advice concerning this issue. While she admitted that she often feels less than confident in her position, she also explained that she has no fear in asking for help. In the case of the chicken feeding facility, she reached out to her resources and asked them for their help.

To probe her leadership style and philosophy I asked her what she would do if she found that one of her off-site campus programs had enrollment problems due to poor class offerings. She responded that if it were a personnel problem she would call a meeting of the people at the off-campus site and would apologize and talk with them. She also said she would talk with the teacher and find out what was going on, and what could be done to fix the problem. This approach of reaching out to the public, while part of her job to insure their continued business or satisfaction with her institution, is also representative of how she views her responsibilities as a leader. Her equal reach and concern with her employees and customers represented the many complex levels of her web.

Throughout our interview process she proclaimed that she really didn't think she was a leader, although her position carried that title. She said that she really doesn't think about it. She works long hours to keep on top of her job. In addition, she pays close attention to, and sometimes gets overwhelmed by the details of her job (e.g. notes of congratulations to faculty that have retired, guest lecturers for conferences), even though she gets it all done she defers the power or the success to other people. She repeatedly told me that she was just extremely lucky, and that she had had the opportunity to work with extraordinary people. While Academic Sarah did not perceive of herself as a leader, she did lead the decision making process in meetings, and does lead her academic administration team by creating agendas for each meeting. Her attention to detail makes her a leader in many diverse situations.

Activist Lindy, on the other hand, leaves the details to others and instead creates visions of what people can become. Although she is noted for helping to create many agricultural organizations and movements, she realizes that it's "not everybody's cup of tea, I wasn't real comfortable...

but somebody had to do something"(interview, 8-15-00). Lindy explained "I was a woman in agriculture and I was articulate... people wanted me to speak up, and I had support at home so I could" (interview, 8-15-00). Even though she was articulate, she still struggled with the leader label. When asked if she considered herself a leader she replied:

> I do now and during the last five years, but before, I was in a learning apprenticeship. I didn't know how to articulate. I gained confidence from people, they make me go further. It took a while to work through [my lack of confidence], I didn't feel confident in my position. I differed to males, yet, in my gut I knew, but I wouldn't trust it (interview, 8-16-00).

In her public life Lindy saw problems and kept asking questions about them. When she couldn't find answers or long lasting solutions, she created structures and organizations to help resolve the problems. At first she thought her pattern of creating organizations and moving on to other problems was a negative, but she's come to think that "maybe it's a skill... I'm good at getting things off the ground, writing by-laws, setting up structures, and organizing meetings..." (interview, 8-16-00).

Seeing problems that need solutions and seeking answers has fueled many of her leadership pursuits. She began her leadership experience by asking "lots of questions of the guys about organizing, farm policy, and legislation. After a period of time I gained confidence in what I was doing. [It was then that] I started finding doors shut to me" (interview, 9-11-00). When she started out asking questions the men were happy to teach her and used her as another set of helping hands, but as she learned and gained confidence they were less receptive to her. She faced "real resistance from guys telling me I couldn't step into *that* leadership position" (interview, 9-11-00). Comments like these left her feeling like she "had to circumvent them" (interview, 9-11-00). Thus, she began "making myself available and making myself visible to show I was a worker" (interview, 9-11-00). She found that if people find out you will speak or you will help, they will ask you more and more (interview, 8-16-00). And thus she became a leader in the traditional men's organizations and then branched out and created her own network amongst women.

In the beginning of her leadership career she began by making her voice heard through letters to the editor of local and state newspapers, calls to morning talk shows, and providing her time and opinions for newspaper reporters. She is committed to improving both agricultural practices and way of life. While these beliefs seem as traditional as American apple pie, many people through the years have classified her as a "wacko" (interview, 8-16-00). However today, many call her a leader. Regardless of the label, she has become a passionate leader of a grassroots movement of people promoting responsible land stewardship. With support from her family, personal dedication, and the possession of feeling comfortable in group settings, she has "snowballed," or worked her way up the ladder or into the center of the web to become a leader.

Part of the snowball effect has been her role in organizing like-minded people into communities of support or activism. The idea that we are all a unified group living and sharing the earth and its resources shape many of her philosophies and actions as a leader. This basis is one of the major reasons she speaks out and creates new support systems for her neighbors in her

community. The other reason is that as she worked with in the existing agricultural support systems, organized and run by men, she realized that the systems were not working.

> Instead of reforming a system that's not ever really worked for us, how about let's strike off and try some new things. This eventually led to creating networks of women, because it was too frustrating to work with men who were trying to reform a system I didn't think was reformable (interview, 9-11-00).

Her leadership, as with the other women in this study, is a mix of reaching out and solving problems. She is unique however, because she is one of two informants who classified herself as a leader. This could be in part due to their age. Both women, Lindy and Maria the politician, are mature women (over 50) who classify themselves as leaders. In Lindy's case she has become more comfortable with the leadership title as she has matured. She has continued to learn how to lead and has become more and more of an expert on activist issues. Today rather than deferring to someone else, Lindy chooses to take on the challenge and responsibility of helping people become better members of their communities and stewards of their lives.

Conclusion

While women, in this study, did not perceive of themselves as leaders they were passionate about various agricultural causes and issues and have therefore created structures, organized people, and worked in support of their beliefs. They reported that they saw problems and realized that they could be the women to solve those problems. In some cases this was related to their family situation (i.e. the 1980 farm crisis effected their farming operation, food safety and their children's health), but this was not what they thought of as leading, rather it was "just doing what they do." However all of the women determined their passions, and used those as torches to guide their way. Activist Lindy explained that passion, or conviction from the heart, is empowering

> Speaking from the heart and soul [with passion] is really good. It's where you're most comfortable and knowledgeable. Find something you like and go for it. People hesitate and squelch their passions [because they're] not confident that they can go forward and provide the things they want in their life (interview, 9-11-00).

From their passions the women have sought to develop and incorporate people into their webs, either through education, service, or emotional care. They lead through reaching out to individuals in an effort to help them. In doing so, they become leaders to those whom they reach out to and increase their circle of leadership, these acts also strengthen their positions and voices. However, when it was pointed out that they are considered leaders or have demonstrated leader-like attributes, they were quick to point out that they have just been "lucky" or that the stars have lined up for them. This could be in part a reflection on the women's lack of formal leadership training. Nonetheless, it was interesting to find that the two mature women in the study now call themselves leaders, but did not in the past.

Recommendations

Based on the findings and conclusions of this study the following recommendations regarding women leaders and educational programming and assistance are offered.

1. Women should not give up. Although they lead differently and face many external and internal challenges, women are needed as leaders. While many administrators may feel that education is a requirement for leadership, the women in this study were not trained in leadership, however each woman was informally taught and guided through career stumbling blocks by male mentors who both guided and inspired them in their pursuits.

2. Women or men who aspire to lead need to find their personal passion. Bennis (1989) stated that to be a leader one must know themselves first. Part of knowing one's self is to identify what matters and what is important, what is worth living and fighting for? Each woman had, through many experiences with "burning in the gut" (interview with Kay, 8-7-00) feelings, and thus learned what was important and worth fighting for to them.

3. If women desire to lead then they need to step up and make themselves available for leadership opportunities. When studying leaders the researcher naively assumed that "everyone" would want to lead. Academic Sarah rebutted this, in saying, "people are happy to have you lead... Most people don't want to provide leadership to a group"(interview, 8-15-00). From this comment and others like them from the other women, the researcher recommends that if women want to lead they should go for it. Eleanor Roosevelt once said, "the only thing to fear is fear itself." For persons wanting to lead, their own fears and/or insecurities might be the largest obstacle they face. Activist Lindy explained that only after she learned to "trust her gut" (interview, 9-11-00) was she able to feel comfortable leading. Therefore, step up, try it out, and make yourself available. While not all efforts will lead to leadership or success, they will probably lead to learning. And as Political Maria shared, "the stars lined up for me...things fell in my lap, [I] took advantage of opportunities [that] presented themselves" (interview, 9-12-00).

4. Educators can facilitate these three processes by educating male and female students about the different styles of leadership of both sexes. While these women were not formally trained in leadership skills, non-agriculturalists may require education to assist them in learning how to work within the agricultural structure. Finally awareness of differences, opportunities, and passions may help both sexes more cooperatively work together for the strengthening and betterment of the agricultural industry.

References

Baxter, C. A., & Hoover, T. S. (1992). A profile of women faculty members in agricultural teacher education. NACTA, 36(4), 7-9.

Bem, S. L. (1993). The lenses of gender: Transforming the debate on sexual inequality. New Haven, CT: Yale University Press.

Bennis, W. G. (1993). An invented life: Reflections on leadership and change. Reading, MA: Addison- Wesley.

Berdahl, J. L. (1996). Gender and leadership in work groups: Six alternative models. Leadership Quarterly, 7(1), 21-40.

Book, E. W. (1998, March). Leadership for the millennium. Working Woman, 29-34.

Burns, J. M. (1978). Leadership. New York: Harper Row.

Clark, M. C., Carafella, R. S., & Ingram, P. B. (1998). Leadership at the glass ceiling: Women's experience of mid-management roles. Initiatives, 58(4), 59-70.

Eagly, A. H., & Karau, S. J. (1991). Gender and the emergence of leaders: A meta-analysis. Journal of Personality and Social Psychology, 60(5), 685-710.

Gardner, J. W. (1990). On leadership. New York: The Free Press.

Gilligan, C. (1982). In a different voice: Psychological theory and women's development. Cambridge, MA: Harvard University Press.

Glaser, B. G., & Strauss, A. L. (1967). The discovery of grounded theory: Strategies for qualitative research. Chicago: Aldine Publishing Company.

Hassanein, N. (1997). Networking knowledge in the sustainable agriculture movement: Some implications of the gender dimension. Society and Natural Resources, 10(3), 251-257.

Hassanein, N. (1999). Changing the way America farms: Knowledgeable and community in the sustainable agriculture movement. Lincoln, NE: University of Nebraska Press.

Hegstrom, J. L., & Griffith, W. I. (1992). Dominancy, sex, and leader emergence. Sex Roles, 27(5/6), 209-220.

Helgesen, S. (1990). The female advantage: Women's ways of leadership. New York: Doubleday Currency.

Henderson, J. L., & Cooper, B. E. (1987). The representation of women scientists in land grant colleges of agriculture. NACTA Journal, 31(2), 14-17.

Hewitt, M., & Howell, D. L. (1991). Being the odd one in a profession. The Agricultural Education Magazine, 63(8), 19-20.

Kolb, J. A. (1997). Are we still stereotyping leadership?: A look at gender and other predictors of leader emergence. Small Group Research, 28(3), 370-393.

Kouzes, J. M., & Posner, B.Z. (1995). The Leadership challenge: How to keep getting extraordinary things done in organizations. San Francisco: Jossey- Bass Publishers.

Loden, M. (1985). Feminine leadership or how to succeed in business without being one of the boys. New York: Times Books.

Long, S. (1998). Discourse and corporate leadership: Transformation by or of the feminine? In E. B. G. Klein, F.; & Herr, P. (Ed.), The Psychodynamics of leadership (pp. 219-246). Madison, CN: Psychosocial Press.

Miller, L. C., & Neth, M. (1988). Farm women in the political arena. In W. G. Haney, & Knowles, J. B. (Ed.), Women & Farming (pp. 357-380). Boulder, CO: Westview Press.

Morrison, A. M., & Von Glinow, M. A. (1997). Women and minorities in management. In R. P. Vecchio (Ed.), Leadership (pp. 521-541). Notre Dame, IN: University of Notre Dame Press.

NASS, U.-G. . (1999). Quick Facts: From the census of agriculture (Pamphlet AC97-P-1). Washington, D.C.: United Sates Department of Agriculture.

Owen, W. F. (1986). Rhetorical themes of emergent female leaders. Small Group Behavior, 17, 475-486.

Perry, J. E., & Ahearn, M. C. (1994). Farm women blend farm and off-farm work. Rural Development Perspectives, 9(3), 24-31.

Romano, C. R. (1996). A qualitative study of women student leaders. Journal of College Student Development, 37(6), 676-683.

Rosener, J. B. (1990, November-December). Ways women lead. Harvard Business Review, 119-125.

Rosener, J. B. (1995). America's competitive secret: Utilizing women as a management strategy. (1 ed.). New York: Oxford University Press.

Sachs, C. E. (1996). Gendered fields: Rural women, agriculture, and environment. Boulder, CO: Westview Press.

Schwandt, T. A. (1994). Constructivist, interpretivist approaches to human inquiry. In N. K. Denzin, & Lincoln, Y. S. (Ed.), Handbook of qualitative research (pp. 118-137). Thousand Oaks, CA: Sage.

Sinclair, A. (1998). Doing leadership differently: Gender, power, and sexuality in a changing business culture. Carlton South, Victoria: Melbourne University Press.

Sternweis, L., Wells, B. L. (1992). The missing perspective: Leadership in rural women's terms. Social Development Issues, 14(2/3), 41-49.

Sturnick, J. (1999). Women who lead: Preserving in the face of skepticism. The Presidency, 2(2), 28-33.

Tevis, C. (1995, April). Women in ag. Successful Farming, 93, 16-23.

Wells, B. L., & Tanner, B. O. (1994). The organizational potential of women in agriculture to sustain rural communities. Journal of the Community Development Society, 25(2), 246-258.

Wells, B. L. (1998). Creating a public space for women in US agriculture: Empowerment, organization and social change. European Society for Rural Sociology, 38(3), 371-400.

Leading Like a Woman in a Man's World: Women's Conceptualizations Of Leadership in the Agricultural Industry

A Critique

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This qualitative study explored how women who have achieved "leadership titles" lead in the agricultural industry. The researcher provided a thorough review of the literature and included helpful statistics from the National Agricultural Statistics Service. An interesting finding in the review of literature was how the farm crisis of the 1980's boosted farm women into the political and organizational arena. The researchers appeared to use the case study approach which allowed for interviewing as well as observation of the subjects. The researcher mentioned "purposive sampling techniques" since this procedure is used by researchers who think that certain characteristics are typical or representative of the population. The researcher chose the women for this study based upon her interpretation of what was representative of the norm and what was not. The citation for Irwin (1995) is missing. I think that citation is important because it was from Irwin's case study that the researcher developed grounded theories for this study. The paper was somewhat confusing in explaining what a grounded theory was. Can a researcher construct grounded theories based upon one study, in this case Irwin's (1995)? According to Denzin and Lincoln (Eds., 2000), developing grounded theory is an iterative process and often the researcher needs to gather more data from the subjects. I wanted to know what the researcher concluded the grounded theories were for this study unless it is the web-like or communal leadership style that was cited by the researcher from Rosener (1990, 1995) and Helgesen (1990). I think a strength of the study is the use of a triangulated research process where more than one method was used.

The researcher interviewed five women for this study. I would have liked to have known the titles since title was one of the criteria used for selection and the ages of the women. I'm not totally convinced that some of what the researcher is calling leadership qualities in these women are not just in some instances their personalities coming through. For example, the woman referred to as Academic Sarah was very detailed oriented as she created agendas for each meeting. The researcher stated that "her attention to detail makes her a leader in many diverse situations." Does it? According to Kouzes and Posner (1990), "the distinction between managing and leading is that managers get people to do things while leaders get people to want to do things." (p.27). Is it possible that some of the women interviewed were good managers of details and organizers who passionately believed in what they were doing? So, having a title that implies a leadership position may not necessarily make that person a leader by the broader definition of motivating people toward a common vision.

The recommendations based upon this study seem a little encompassing and at times just what common sense would tell us. The first recommendation that women should not give up seems rather obvious but relate this back to the agricultural industry. What specific leadership traits does the industry need that women could fulfill? My question is what must a woman do to enhance her opportunity to be a leader in the agricultural industry? The researcher refers to women who "trust their gut" which sounds like following your intuition. I would have liked to see some discussion on how following one's intuition can positively affect their leadership abilities. I think this is a subject that needs further exploration especially with the diversification of the agricultural industry which may encourage more women to seek leadership roles.

STRUCTURING AGRICULTURAL EDUCATION RESEARCH USING CONCEPTUAL AND THEORETICAL FRAMEWORKS

Introduction

The future of agricultural education depends upon many variables, not the least important of which is the acquisition and application of new knowledge through research. However, the quality of research in agricultural education has often been questioned. Throughout the past two decades it has been criticized as being without focus, of limited scholarship and/or importance, and considered by some to be inferior to research conducted in other disciplines (Buriak & Shinn, 1993; Silva-Guerrero & Sutphin, 1990; Warmbrod, 1986). Buriak and Shinn (1989) reported agricultural education research to be perceived by external decision makers (i.e., Deans of Education, Deans of Resident Instruction in Agriculture, Experiment Station Directors) as "soft," without clearly defined objectives, and lacking in rigor. Furthermore, Buriak and Shinn (1993) reported internal perceptions to be similar to those of the earlier study involving external decision makers.

The perceived orientation of agricultural educational professionals appears to be toward teaching and service rather than research (Buriak & Shinn, 1989). Newcomb (1990) noted that in many cases university faculty prefer to teach, advise, design curricula, and work with people – only conducting research to the extent necessary "to get by" (p. 2). Newcomb suggested that research in agricultural education become more focused, coordinated, and conducted with a "passionate vision" (p. 8).

The theoretical framework for this analysis of research lies in Dewey's Steps in Reflective Thinking, better known as the scientific method (Newcomb, McCracken, & Warmbrod, 1993), as adapted by Ary, Jacobs, and Razavieh (1996). Ary, et al. proposed that there is a "method" of inquiry to which all researchers should adhere in investigating phenomena of interest. In addition to the accepted steps of the scientific method, Ary, et al. proposed that research should also be evaluated based upon the assumptions made by the scientists, attitudes of the scientists in controlling for bias, and formulation of scientific theory. Adapted to this study, this framework suggests that there is a model to which all agricultural education research should adhere. Specifically, that model encompasses a structure by which research should be based upon philosophy, purpose, and method, and grounded in both a conceptual and theoretical framework.

Miller (1998) cautioned that researchers need to be "green and growing" (p. 1) and therefore continue to refine their research skills, much as a mechanic would hone his or her skills. To do so means that researchers should devote time to maintaining and/or improving skills – to re-focus their attention to minor details that often are overlooked as research techniques approach automatic skill transfer status. This study seeks to determine the extent to which researchers in agricultural education are using those skills to conduct scholarly research.

Purpose

Buriak and Shinn (1993) noted that human beings are set apart by their ability to solve problems – to do research. Ary, et al. (1996) emphasized the need to follow a systematic procedure in conducting this research. How well does agricultural education research follow a specified procedure? The purpose of this study was to examine the degree to which agricultural education research has adhered to a structured approach over the past decade. The study was guided by the following research questions:

1. What types of research have been conducted in agricultural education?
2. To what extent did researchers use conceptual and theoretical frameworks?
3. To what extent did the conclusions address the conceptual and/or theoretical frameworks used?
4. How has the formation and usage of conceptual and theoretical frameworks in agricultural education research changed over the past decade?

Methods

Research conducted and reported in the Journal of Agricultural Education over the past decade was reviewed by the researchers and classified as to philosophy (quantitative or qualitative), purpose (basic, applied, or action), and the types of methods employed. Articles were also evaluated for their effective use of conceptual and theoretical structures. The Journal of Agricultural Education was selected because it is the premier refereed outlet for current published research in agricultural education.

The researchers evaluated all research articles published in the Journal of Agricultural Education from 1989 to 2000, using an instrument developed by the researchers. Content validity of the instrument was established by a panel of six university faculty in agricultural education at a land grant university. Inter-rater reliability on the instrument was established at $r = .99$.

Journal articles were coded and reviewed for the following components:

- Extent to which the researcher(s) developed a conceptual framework
- Extent to which the researcher(s) developed a theoretical framework
- Number of citations used to establish the conceptual framework
- Number of references cited
- Number of research references cited
- Extent to which the researcher(s) used citations to tie conclusions to the literature base
- Type of research by philosophy, purpose, and method used

Data were analyzed using descriptive statistics, including measures of central tendency and dispersion.

Philosophy of Research

According to Gall, Borg, and Gall (1996), researchers have different epistemological assumptions about the nature of scientific knowledge and how to acquire it. As a result of these

differences, research is categorized into two groupings based upon the *philosophy* of the researcher. Those two categories are positivistic (quantitative research) and post-positivistic (qualitative research). Quantitative researchers collect numerical data on observable behavior and analyze that data using numerical analysis. Qualitative researchers, on the other hand, believe that research is best constructed as interpretations by individuals and that these interpretations are transitory, situational, and analytically inductive (Gall, Borg, & Gall).

Wardlow (1989) classified research based upon philosophy into three categories: positivistic mode, interpretive mode, and critical science mode. The positivistic mode in Wardlow's classification corresponds to the quantitative grouping, whereas the interpretive and critical science modes correspond to the qualitative classification used by Gall, Borg, and Gall (1996).

Purpose of Research

In addition to distinction based upon the philosophy of the researcher, studies can also be classified by type based upon the *purpose* for which the research was done. Whereas different names are used to describe these groupings, the operational terms used in this study are "basic," "applied," and "action" research (Ary, Jacobs, & Razavieh, 1996).

Basic research is that research conducted in an original area of inquiry, to generate new knowledge, or for the formulation of theory. The primary concern of this type of research is the discovery of knowledge for the sake of knowledge (Ary, et al., 1996). Ary, et al. define basic research as having the aim of expanding "the frontiers of knowledge without regard to practical application" (p. 26). For example, Piaget's initial work and genesis of his theory of intellectual development was basic research (Kolb, 1984). Rosenshine and Furst offered another often-cited example of basic research in their Principles of Learning (Rosenshine & Furst, 1971).

Whereas basic research generates new knowledge, most educational research is conducted to test or expand that knowledge. This type of research, "applied," expands upon existing theory and aims to solve specific problems. Whenever theories are generated, research either confirms or rejects the accuracy of those theories as they relate to particular variables under study. As may be surmised from Rosenshine and Furst's Principles of Learning (Rosenshine & Furst, 1971), there is not always a distinguishing line between basic and applied research. While there is currently a trend to merge the two, that union has not yet occurred. For this study the two are treated as separate entities.

Action research is defined by Leedy (1997) as "a type of applied research that focuses on finding a solution to a local problem in a local setting" (p. 111), has specific application, and involves the decision-maker in conducting the research. For example, testing the effectiveness of a recruitment activity for the purpose of improving student recruitment in a college of agriculture is action research.

Research Method

Research is further categorized based upon the method employed to conduct the study. Whereas several classification systems are in place (Ary, Jacobs, & Razavieh, 1996; Gall, Borg,

& Gall, 1996; Isaac & Michael, 1990; Leedy, 1997; Van Dalen & Meyer, 1979), for the purpose of this analysis methods have been categorized into eight groups: Holistic (qualitative), Historical, Survey, Correlational, Ex post facto (Causal-comparative), Experimental (includes Pre-experimental, Quasi-experimental, True Experimental), Delphi, Evaluation.

Conceptual versus Theoretical Frameworks

Several researchers have advocated the use of strong conceptual and/or theoretical bases in agricultural education research (Buriak & Shinn, 1989; Lee, 1985; Silva-Guerrero & Sutphin, 1990; Wardlow, 1989; Williams, 1997). However, the two terms – "conceptual framework" and "theoretical framework" – are likely the two most misunderstood and misused terms in agricultural education research today. As such, the two terms are often erroneously interchanged.

A conceptual framework builds a structure or "concept" of what has been learned in a particular area of study. Conceptual frameworks are similar to a standard literature review in that the conceptual framework lists the important research that has been conducted in a particular area. It goes beyond a simple literature review, however, in that it truly builds a "framework" of research. That is, it structures the literature in such a manner as dictated by the researcher to best explain the natural progression of research for the phenomena under study (Ary, et al., 1996).

By contrast, a theoretical framework is a framework for explanations about the phenomena being investigated (Gall, Borg, & Gall, 1996). The theory itself is defined by Gall, Borg, and Gall as "an explanation of a certain set of observed phenomena in terms of a system of constructs and laws that relate these constructs to each other" (p. 8). Piaget's theory of intellectual development is an example of a theoretical framework. It has shaped educational curricula and formed a basis for multitudes of studies to better understand and utilize the theory. Other examples include Fishbein and Azjen's theory of attitudinal influence (Fishbein & Ajzen, 1975), Vroom's expectancy theory of human motivation (Vroom, 1964), Rosenshine's explicit teaching model (Rosenshine, 1986), Mitzel's model for the study of classroom teaching (Duncan & Biddle, 1974), and Witkin's theory of cognitive styles (Witkin, 1973).

Results

Question 1: What types of research have been conducted in agricultural education?

Most of the research conducted in agricultural education over the past decade has been quantitative, applied, survey research. As noted in Table 1, of the 356 articles evaluated, 303 (85.1%) were classified as quantitative research. When categorized by the purpose of the research, 328 articles (92.1%) were determined to be applied research, 23 (6.5%) were action research, and the remaining 5 articles (1.4%) were basic research. When classified as to the method employed to conduct the research, 192 studies (53.9%) used a survey method. Correlational studies accounted for 58 studies (16.3%), followed by Experimental (n = 33, 9.3%), Holistic (n = 21, 5.9%), Historical and Delphi (n = 15, 4.2% each), Ex post facto (n = 12, 3.4%), and Evaluation (n = 10, 2.8%).

Table 1
Classification of Research by Philosophy, Purpose, and Method

Type of Research	f	%	No. of Citations: Conceptual-Theoretical Framework M	No. of Citations: Conclusions M	No. of References: Cited in Reference Section M	No. of References: Research Based M
Philosophy						
Quantitative	303	85.1	14.17 (7.83)	2.47 (3.44)	14.68 (6.07)	6.63 (4.57)
Qualitative	53	14.9	8.89 (6.87)	.91 (1.58)	18.26 (11.41)	8.87 (12.83)
Purpose						
Basic	5	1.4	11.20 (14.64)	1.20 (1.64)	20.40 (9.79)	5.00 (5.20)
Applied	328	92.1	13.30 (7.81)	2.18 (3.25)	15.14 (7.23)	6.99 (6.63)
Action	23	6.5	15.13 (7.72)	3.17 (3.81)	15.17 (6.28)	7.00 (5.13)
Method						
Survey	192	53.9	13.53 (7.93)	2.08 (3.01)	13.55 (5.78)	6.01 (4.05)
Correlational	58	16.3	16.43 (8.04)	3.66 (3.63)	16.72 (5.76)	7.47 (4.59)
Historical	15	4.2	7.47 (9.26)	.67 (.98)	23.80 (13.81)	14.93 (17.95)
Experimental	33	9.3	14.18 (6.45)	2.27 (3.39)	17.52 (6.05)	7.33 (4.55)
Holistic	21	5.9	9.95 (6.93)	1.00 (1.38)	18.19 (11.78)	9.19 (12.31)
Evaluation	10	2.8	10.10 (5.95)	2.50 (5.89)	13.00 (9.43)	5.10 (8.70)
Delphi	15	4.2	9.53 (3.52)	.53 (1.55)	13.33 (4.13)	4.67 (3.72)
Ex Post Facto	12	3.4	15.08 (8.71)	3.75 (5.15)	16.50 (5.37)	9.42 (4.64)
Totals	356	100	13.38 (7.91)	2.23 (3.28)	15.22 (7.22)	6.97 (6.52)

Note. Standard deviations are in parentheses.

Question 2: To what extent did researchers use conceptual and theoretical frameworks?

As indicated in Table 2, a vast majority of the articles reviewed (87.6%) cited an appropriate and clear conceptual framework. However, 10 of the accepted articles (2.8%) had no conceptual framework. The remaining 34 articles displayed an attempt at creating a conceptual framework, but the review of literature was deemed so weak that a clear conceptual framework could not be discerned.

Only one of the studies with no conceptual framework was basic research – the type of research most prone to be lacking in structure because of its nature to generate theory. Six of the ten studies lacking a conceptual framework were actually applied research – the type of research that necessitates building upon existing conceptual models.

Qualitative studies failed more often than did quantitative studies to build around a theoretical framework. A total of 30 of the 53 qualitative articles (56.6%) failed to cite a theoretical framework, whereas 143 of the 303 quantitative articles (47.1%) had no theoretical framework. Likewise, 50% (n = 5) of the studies that offered no conceptual framework were qualitative studies.

Action research articles failed more frequently than did either basic or applied research to develop a sound theoretical framework. Approximately 57% (n = 13) of the action research articles reviewed had no theoretical framework, as compared to 40% (n = 2) of the basic research and 48% (n = 156) of the applied research articles. The mean number of citations used to establish the conceptual and/or theoretical frameworks was 13.38 (SD = 7.91, Md = 12). (See Table 1.)

Table 2
Extent to Which Conceptual and Theoretical Frameworks Were Established

Degree to Which Established	Conceptual Framework		Theoretical Framework	
	f	%	f	%
None	10	2.8	173	48.6
Attempted to establish, but result was unclear	34	9.6	78	21.9
Cited and developed appropriate framework	312	87.6	105	29.5
Totals	356	100	356	100

Researchers cited a limited number of references in establishing conceptual and theoretical frameworks. While the *number* of references cited is not as important as the quality of the cited research base, it is difficult to develop a conceptual framework without an extensive review of literature.

Whereas some articles cited a plethora of references, others were published with very limited numbers of citations. As indicated in Table 3, a combined total of 75.3% of articles had from 6 – 20 citations. Likewise, the type of references cited contained fewer research-based references than is typical for applied research. Nearly half (49.4%) of the articles contained five or less *research* citations. Of the articles that contained more than 25 research citations, all were syntheses of research.

Table 3
Number and Type of References Cited in Journal of Agricultural Education Articles

Number of Citations	All Cited References		Cited Research References	
	f	%	f	%
0 – 5	21	5.9	176	49.4
6 – 10	70	19.7	112	31.5
11 – 15	113	31.7	48	13.5
16 – 20	85	23.9	10	2.8
21 – 25	42	11.8	4	1.1
More than 25	25	7.0	6	1.7

The mean number of references cited per article was 15.22 (SD = 7.22), of which the mean number of research citations was 6.97 (SD = 6.52). Displayed graphically in Figure 1, the number of citations listed in the reference section varied from 3 – 51, with a skewed distribution of numbers. The median number of references listed was 14.

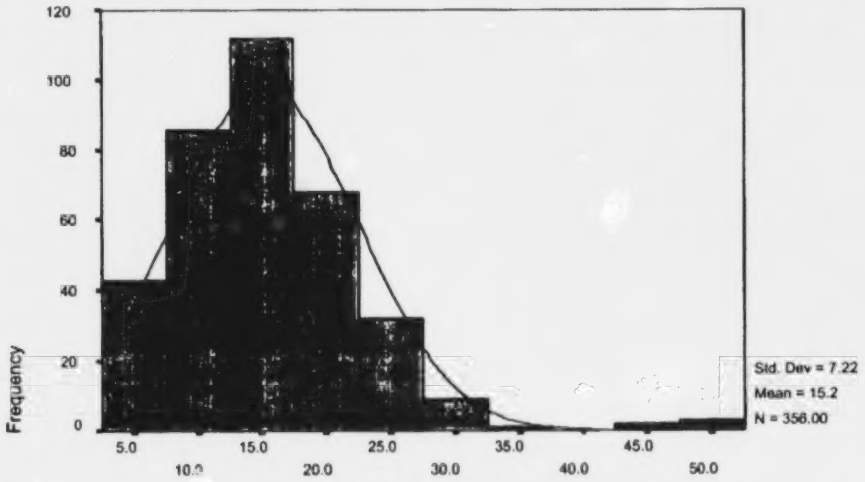

Figure 1. Number of References Cited

Table 3 and Figure 2 each display representations of the number of *research* articles listed in the references of each article. Since over 92% of the articles accepted for publication were applied research, logic would dictate that a vast majority of references listed would be research-based. As indicated above, the mean number of research studies that authors cited was 7.00. The median number of research references listed was 6. As was the case with the total number of citations, the distribution of the number of research citations was skewed.

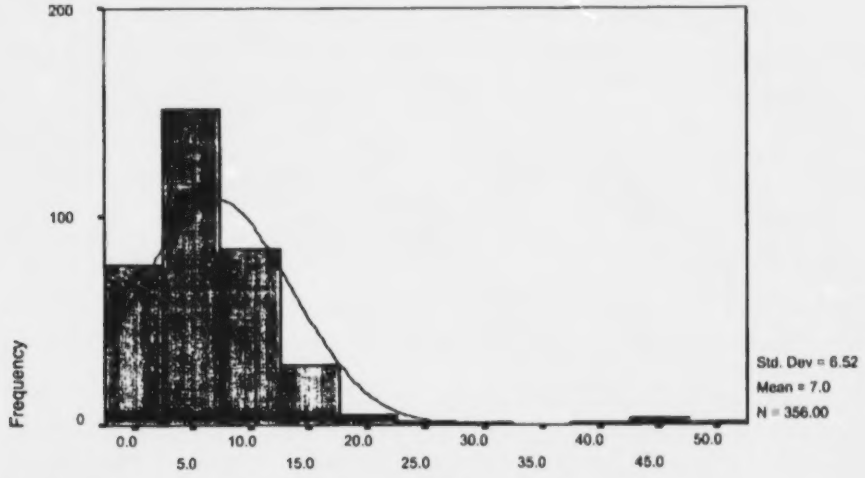

Figure 2. Number of *Research* References Cited

Question 3: To what extent did conclusions address the conceptual and/or theoretical model used?

As presented in Table 1, the mean number of citations found in the conclusions, recommendations, and implications sections of articles was 2.23 (SD = 3.28, Md = 1). Table 4 contains data showing the distribution of citations as they were applied to the existing literature base. Although over 92% of the articles reviewed were applied research, which should have required that researchers compare their results with those of others, 76.2% of the articles failed to compare the findings with as few as three prior studies that had been cited in the conceptual or theoretical frameworks. Nearly one-half (47.8%) failed to compare results with at least one piece of research cited in the conceptual framework, or to the theoretical framework that supposedly guided the study.

Table 4
Number of Citations in the Conclusions, Recommendations, and/or Implications Sections of Journal of Agricultural Education Articles (N = 356)

	All Cited References	
Number of Citations	f	%
0	170	47.8
1	44	12.4
2	32	9.0
3	25	7.0
4	18	5.1
5	11	3.1
6	14	3.9
7	11	3.1
8	9	2.5
9	4	1.1
10 or more	18	5.1

Question 4: How has the formation and usage of conceptual and theoretical frameworks in agricultural education research changed over the past decade?

As indicated in Table 5, fewer publications in the last third of the decade had appropriately cited conceptual frameworks as compared to publications in the other two periods (n = 110, 106, 96, respectively). However, the number of those without a conceptual framework remained constant (n = 3), whereas the number of articles with weak or unclear conceptual frameworks increased over time (n = 3, 12, 19, respectively).

Selection and use of theoretical frameworks improved over the decade (Table 5). The number of studies with no theoretical framework remained relatively constant throughout this period of time (n = 76, 44, 53, respectively). As noted, the mid-1990s saw the most appropriate use of theoretical frameworks. Those that categorized as weak or unclear remained virtually

unchanged over the ten-year period of the analysis (n = 27, 26, 25, respectively). A dramatic increase in the proper citing of theoretical frameworks occurred from the first third of the decade to the middle portion, but dropped somewhat in the last part of the decade (n = 13, 52, 40, respectively).

Table 5
Degree to Which Conceptual and Theoretical Frameworks Have Been Used and Reported Over Time

	Date of Publication		
Degree to Which Established	1989-1992	1993-1996	1997-2000
Conceptual Framework			
None	3	4	3
Attempted to establish, but result was unclear	3	12	19
Cited and developed appropriate framework	110	106	96
Theoretical Framework			
None	76	44	53
Attempted to establish, but result was unclear	27	26	25
Cited and developed appropriate framework	13	52	40
Totals	116	122	118

Conclusions/Implications/Recommendations

Most of the research reported in the Journal of Agricultural Education over the past decade can best be classified as quantitative, applied, and survey research. Of the 356 articles evaluated, over 85% were classified as quantitative research. Based upon purpose, over 92% of the articles were determined to be applied research. By method, nearly 54% of the articles reviewed used a survey design.

When classified by purpose, research published in the Journal of Agricultural Education was almost entirely applied research. Why? Are reviewers for the Journal more likely to only accept research that builds upon existing theory, or is it that agricultural education researchers do little basic or action research? Is action research deemed to be more biased because of its design to address a problem in which the researcher is intimately involved? Do agricultural educators fail to use research-based solutions when solving their immediate problems, and therefore render those studies unpublishable? Further research directed at determining the attitudes of Journal of Agricultural Education reviewers toward submission criteria may be helpful in answering some of these questions. In addition, Journal editors may wish to implement training seminars to assist reviewers in improving skills in critiquing submitted articles.

Both quantitative and qualitative studies often failed at developing sound conceptual and/or theoretical frameworks. Qualitative studies were especially weak in tying research to theoretical frameworks, or to have well-developed conceptual frameworks. Is the profession taking

qualitative research seriously? Regardless of philosophy employed, sound research principles and practices should be used in all types of research (Gall, Borg, & Gall, 1996).

Researchers may have a limited understanding of the functions of, and differences between, conceptual and theoretical frameworks. Nearly 88% of the studies analyzed developed a clear conceptual framework, however, less than 30% of the published articles cited an appropriate theoretical framework. This is especially poignant since 92.1% of the articles accepted were applied research – the type of research that explains the theory behind the theoretical framework (Ary, et al., 1996). Likewise, when theoretical frameworks were cited, often they were not well connected to the research being conducted. Interestingly, qualitative studies failed more often than did quantitative studies to build around a theoretical framework. Over half (56.6%) of the qualitative studies published failed to cite a theoretical framework.

Researchers cited a limited number of references in establishing conceptual and theoretical frameworks – both in explanatory citations and in citations of related research. Whereas some articles cited a plethora of references, others were published with a very limited number of citations. Nearly half (49.4%) of the articles contained five or less research citations. Of those that contained more than 25 research citations, all were syntheses of research. While the *number* and type of references cited does not guarantee that a conceptual base has been established, it is difficult to develop this framework without an extensive review of literature. Not only should a greater number of references be utilized, researchers should also focus on developing a quality review of literature. These findings further emphasize the need to improve the rigor of research in agricultural education, as called for by Warmbrod (1986).

Most articles published in the Journal failed to tie conclusions to the conceptual and/or theoretical frameworks around which the research was conducted. Nearly 48% of the articles reviewed failed to compare research findings with even one piece of research cited in the conceptual framework, or to the theoretical framework that supposedly guided the study.

As the decade progressed, articles accepted to the Journal tended to have less well-developed conceptual frameworks. Whereas the number of articles with no conceptual framework remained almost constant, the quality of cited frameworks deteriorated. In the case of theoretical frameworks, the mid-part of the decade produced the most studies with research closely tied to a theoretical framework. Did the profession react to the warnings of Buriak and Shinn (1989; 1993), Silva-Guerrero and Sutphin (1990), and Warmbrod (1986)? If so, are researchers back-sliding into old style of the "quick and dirty" publications? To predict a trend goes beyond the scope of this investigation, but the situation warrants further attention.

As noted by Buriak and Shinn (1989), in order to gain the respect of external decision makers, agricultural education researchers should adopt and use more rigorous research techniques. A decade later this call for rigor is still pertinent.

References

Ary, D., Jacobs, L.C., Razavieh, A. (1996). Introduction to research in education (5th ed.). New York: Harcourt Brace College Publishers.

Buriak, P., & Shinn, G.C. (1989). Mission, initiatives, and obstacles to research in agricultural education: A national Delphi using external decision-makers. Journal of Agricultural Education, 30(4), 14-23.

Buriak, P., & Shinn, G.C. (1993). Structuring research for agricultural education: A national Delphi involving internal experts. Journal of Agricultural Education, 34(2), 31-36.

Dunkin, M.J., & Biddle, B.J. (1974). The study of teaching. New York: Holt, Rinehart and Winston.

Gall, M.D., Borg, W.R., & Gall, J.P. (1996). Educational research: An introduction (6th ed.). NY: Longman.

Fishbein, M., & Ajzen, I. (1975). Belief, attitude, intention and behavior. Reading, MA: Addison-Wesley Publishing.

Isaac, S., Michael, W.B. (1990). Handbook in research and evaluation. San Diego: EdITS.

Lee, J. (1985). Agricultural education: Review and synthesis of the research (4th ed.). Inf. Series No. 298. (Eric Document Reproduction Service, ED260 300).

Leedy, P. (1997). Practical research: Planning and design (6th ed.). Columbus, OH: Prentice Hall.

Miller, L.E. (1998). Appropriate analysis. Journal of Agricultural Education, 39(1), 1-10.

Newcomb, L.H. (1990). Transforming university programs of agricultural education. Journal of Agricultural Education, 34(1), 1-10.

Newcomb, L.H., McCracken, J.D., & Warmbrod, J.R. (1993). Methods of teaching agriculture. Danville, IL: Interstate Publishers.

Rosenshine, B. (1986). Synthesis of research on explicit teaching. Educational Leadership, 43(7), 60-69.

Rosenshine, B., & Furst, N. (1971). Research on teacher performance criteria. In B. O. Smith (Ed.), Research in teacher education – A symposium (pp. 37-72). Englewood Cliffs, NJ: Prentice-Hall.

Silva-Guerrero, L., & Sutphin, H.D. (1990). Priorities for research in agricultural education, 31(1), 1-13.

Van Dalen, D. (1979). Understanding educational research. New York: McGraw-Hill.

Vroom, V.H. (1964). Work and motivation. New York: John Wiley and Sons.

Wardlow, G. (1989). Alternative modes of inquiry for agricultural education. Journal of Agricultural Education, 30(4), 2-6.

Warmbrod, J.R. (1986, March). Priorities for continuing progress in research in agricultural education. Paper presented at the 35th Annual Southern Region Research Conference in Agricultural Education. North Little Rock, AR.

Williams, D.L. (1997). Focusing agricultural education research: An agenda for the graduate student. Journal of Agricultural Education, 38(3), 28-35.

Witkin, H. A. (1973). The role of cognitive style in academic performance and in teacher-student relations (Research Bulletin). Princeton, NJ: Educational Testing Service.

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A Critique

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The authors of this study contributed to the profession by researching a very important topic – how well the theoretical and conceptual frameworks are constructed in the articles that are submitted to the Journal of Agricultural Education. Because some of the research conducted in agricultural education has been criticized in the past, it is necessary for the profession to monitor not just the quantity but the quality of the articles submitted to the Journal. The authors did a good job of explaining the purpose and methods for how this study was done. They also constructed and tested the instrument to ensure validity and reliability.

Regardless of whether a researcher uses a conceptual or a theoretical framework, both should be researched and structured to support the study which is in progress. The authors do a good job of distinguishing the differences between a conceptual and a theoretical framework. The authors provided examples of what a theoretical framework could contain by citing popular theories. The conceptual framework is more difficult to describe and possibly a brief example of how a conceptual framework would progress would have been helpful. One idea would have been to define a concept and briefly show how the conceptual framework would have flowed from there.

The authors used descriptive statistics which made the study easy to understand. The use of higher level statistics would have been inappropriate and could have made the results more difficult to comprehend. It is interesting to note that more qualitative studies failed to cite a theoretical framework than quantitative studies. Is this due to the fact that as a profession we are just beginning to use some qualitative methods? Possibly, some more workshops on how to conduct and write qualitative studies may help with this problem. A disturbing finding is that 143 of the quantitative articles or 47.1% had no theoretical framework. How does this look to external decision makers? Could this be one reason why research in agricultural education has been criticized as being "without focus, of limited scholarship, and lacking in rigor?" A thorough literature review not only allows the researcher to gain an understanding of the current state of knowledge about the selected research topic but it also may point out methodological problems that could be changed or avoided. A spin-off of not developing a conceptual and/or theoretical framework is the finding that nearly one-half or 47.8% of the articles submitted failed to compare the results with at least one piece of research cited in the conceptual and/or theoretical framework. How is the research in agricultural education suppose to build upon previous research or develop new theories when nearly half of the articles don't compare their results with previous studies? Where is the focus of the research?

The authors noted that most of the research in agricultural education over the past decade has fallen into the categories of quantitative, applied, and survey research. Should the profession be more open to qualitative approaches which would allow researchers to use multiple methods or triangulation which is defined as the use of multiple research methods to study a phenomenon? Or, should the profession tighten up the quality of the most used research methods then try to incorporate other methods to strengthen the quality of research in agricultural education?

ATTITUDE OF VOCATIONAL TEACHRES TOWARDS TEACHER EVALUATION

Introduction/Theoretical Framework

The Joint Committee on Standards for Educational Evaluation has been sponsored by 14 national teaching associations in their quest for the development of personnel evaluation standards. The standards were meant to help educators develop evaluation tools that met a list of requirements dealing with evaluation standards (Stufflebeam, 1988).

General Guidelines for the Assessment of the evaluation standards have been offered. Assessment should be: simple; cost effective; valid; related to teacher goals; and useful for providing meaningful feedback (Tuckman, 1995). Evaluations were successful when they promoted the success of students, educators, and organizations (Stufflebeam, 1988). Tuckman (1995) indicated that the way teachers were assessed, affected how they taught. Therefore it was imperative to review how they taught. Therefore, it was imperative to review how teachers were evaluated.

Possible evaluation techniques included: observations with rating scales; interviewing; applied performance tests (competency tests) (Shepard, 1992); teacher performance measures (Haertel, 1992); licensure tests; professional skills tests; portfolios; supervisor assessment; peer assessment; and student assessment (Stufflebeam, 1988). These evaluation tools could be placed into two categories, low inference/competency list related tools (summative evaluations), or high inference/global judgments related to teacher professional development (formative evaluations) (Haertel, 1992).

One of the most widely used practices of teacher evaluation was classroom observation (Haertel, 1992). Observations were usually used in evaluation programs that utilized rating scales. Observations that concentrated on specific competencies to be evaluated could also be used in a self-selective way. It was warned that lists of "proficiencies or skills" could be counterproductive or limiting (Leach, Evans, & Whetstone, 1992). Atkins (1996) concluded that a combination of techniques including a formative preconference, followed by a summative observation, and a final post-conference was best for measuring teacher effectiveness.

Measuring teacher effectiveness by observation is actually so difficult that hardly anyone seems to be able to do it successfully, yet one of the most widely used practices for teacher evaluation is classroom observation (Shepard, 1992). In determining who is the best person to evaluate teachers, one must look at three groups: administration; teachers; and, students. Whomever the evaluator may be, there must be considerable effort to maximize the validity of the rating scores.

One of the hardest validity concerns to control in observations was described as the Halo Effect. The Halo Effect was described as a situation where an evaluator's ability to perceive the true teaching performance of a teacher was biased because of predetermined opinions of the person being evaluated (Shepard, 1992; Stufflebeam, 1988). Therefore the evaluator must be credible, honest, professional, and knowledgeable (Stufflebeam, 1988).

Ornstein and Berlin (1995) stated that the most valid appraisal system happened when another professional in the same area of expertise completed the evaluation. Atkins (1996) reported that principals should be well educated with experiences in pedagogy and methodology of teaching. Atkins (1966) also reported that principals should provide some form of peer evaluation and student evaluation.

Justification for student evaluation of teachers is clear. Who can give a better idea of the ability of a teacher than the students who are with the teacher every day (White, 1995)? Student satisfaction with instruction was a measure only validated from students (Tuckman, 1995). Student ratings of teacher performance could be used as supplements to other teacher evaluation tools. Atkins (1996) reported that teachers were in favor of student evaluations of teachers.

Boyd (1989), cited in Wagner and Hill (1996), stated three reasons for teacher evaluations: 1) to provide useful feedback on classroom needs; 2) to provide insights from which teachers develop new strategies; and, 3) to provide opportunities for coaching from principals or peers. Furthermore, Ornstein and Berlin (1995) cautioned that the present utility of teacher competency instruments were not linked to helping teachers advance themselves, but were linked to identifying teacher incompetence.

According to the Joint Committee Standards for Educational Evaluations, the need for sound evaluation of educators was clear: to educate students to achieve educational goals; to use evaluation to select, retain, and develop qualified personnel; and, to manage and facilitate teachers' work. The committee offered five reasons for evaluation: to develop staff; to help faculty look at their strengths; to help discover where faculty needed improvement; to prescribe remediation when needed; and, to develop a fair case for termination. Tuckman (1995) reported the usual reasons for evaluation represented hurdles for teachers, or perspective teachers, to overcome. The reasons for evaluation included certification, re-certification, annual evaluations, and merit raises. All of these reasons represented accountability and constrained teachers, rather than inspire teachers.

Purpose/Objectives

The purpose of this study was to describe the attitude of vocational teachers towards teacher evaluation in the Vanguard Sentinel-Joint Vocational School District (VS-JVSD). Specifically, the study was designed to determine teacher attitudes towards the purpose of vocational teacher evaluations, the mechanics of an evaluation program, and the way that results of an evaluation should be reported to the vocational teacher.

The specific objectives of the study were:

1) to determine vocational teachers' attitudes towards the development of their evaluation process, the main purpose of vocational teacher evaluations, and the benefits gained from past evaluations;

2) to determine teachers' attitudes towards the mechanics of vocational teacher evaluation including length of evaluations, when evaluations should occur, observation procedures, and evaluators of vocational teachers; and,

3) to determine teachers' attitudes towards the reporting of evaluation results and any anxiety involved with the evaluation process.

Methods/Procedures

The initial contact and request for permission to complete the study started with written correspondence to the Superintendent of the VS-JVSD. All vocational teachers in the VS-JVSD received an invitation to volunteer to participate in the study. Interested vocational teachers responding to the invitation to participate in the study were sent information to familiarize the participants with the background of the study prior to consenting to be a participant in the study. Once committed, all research participants were asked to sign a consent form allowing the use of their comments in the study; anonymity was guaranteed to all of the participants. Individual interviews were scheduled with each participating vocational teacher.

The sample of research participants in this study was based on the volunteerism of the vocational teachers in the VS-JVSD. Nine vocational teachers volunteered and were interviewed to gain a perspective on their attitudes towards vocational teacher evaluation. The sample represented 12% of the total population of vocational teachers at VS-JVSD.

Questions for the interviews were derived from the review of literature. A field trial was performed with an original script and revisions were made to the final script. Many of the responses to the interview questions lead to questions about concepts not incorporated in the interview script. These responses added depth and even more meaning to the responses provided by research participants, an advantage of qualitative research.

Personal interviews were conducted to gather information related to the attitudes of teachers toward their evaluation programs. Each interview session lasted approximately two hours. All interviews were held on school premises. Six of the interview sessions were taped and these taped sessions were transcribed. The remaining three interview sessions were not taped, for purposes of anonymity, and were used in their raw data form during data analysis. All interview data was evaluated the same way.

Triangulation was used as a method to ensure internal validity. Triangulation included three forms of data collection. The researchers incorporated document analysis, personal observation, and personal interviews in the data collection process.

An initial reading of the interview transcripts and data record sheets refreshed the researchers about interviews that were conducted earlier in the study. A second reading of the transcripts and interview data allowed the researchers to mentally assign teacher responses to the specific objectives of the study. A third reading of the transcripts was made, and data were coded. Coding was done to match specific statements that corresponded with

the objectives of this study. The researchers numbered each of the objectives and then coded specific teacher responses with corresponding numbers. For final analysis, the coded responses were grouped by their corresponding number.

Member checking was used as a method of ensuring that the researcher's interpretation of teacher responses were accurate. The final data analysis involved the collection of similar responses across the categories of research questions. Similar statements reflecting the attitudes of the teachers interviewed were combined to organize the results of the study.

Results/Findings

The experience level of the teachers that were interviewed in the study ranged from three years of teaching experience to 30 years of teaching experience. Six men and three women were interviewed.

All of the teachers that were interviewed were teaching vocational programs in the VS-JVSD. Six of the teachers interviewed held at least a bachelor's degree in their area of vocational education while three of the teachers interviewed came into teaching after a career in their industry field. Three of the teachers interviewed had adult education teaching experience. Six of the teachers interviewed worked with youth organizations as part of their employment responsibilities.

Teachers were asked to describe who should be involved in developing their vocational teacher evaluations. All but one of the teachers interviewed stated that they as teachers should be involved in the development of the evaluation program. One teacher suggested that it was the responsibility of the administration to develop the evaluation program but that the method should be agreed upon by the teachers and the administrators.

Among the teachers interviewed in the study, two teachers believed that the improvements they had made in their teaching ability could be attributed to their teacher evaluations. Seven teachers believed the push for improvement was intrinsic motivation and the pressure of keeping current with the technology they were expected to teach. Teachers interviewed believed that improvements in their teaching were made not because of evaluations, but from watching other teachers interact with their students, talking with more experienced teachers, attending technical update programs, taking college courses, and talking with business and industry representatives.

Each research participant was asked to describe the way they were currently being evaluated and what effect this evaluation had on the improvement of their teaching. All nine of the teachers interviewed similarly explained the current process of evaluation. All responses included discussion about the administrator observing their class or lab for at least 30 minutes. During the observation, the administrator took notes and rated the teacher with a nominal score in specific areas. After the observation, teachers received a copy of the evaluation form from their administrator with the administrator's score listed in each of the specific areas. Teachers were then given the opportunity to rank themselves in each of the

criteria areas. A meeting was scheduled with the administrator, and the results were discussed.

Two of the teachers interviewed believed that this form of evaluation was helpful to them becoming a better teacher. The general attitude of the teachers was that their current form of evaluation was a waste of time and did very little to help them improve their teaching ability. The teachers that described their current form of evaluation as helpful, described their administrator as an understanding person who was willing to help them improve. In their opinion, their administrator offered advice for improvement and suggested other teachers for them to talk with. These teachers agreed that it was not the process that made their evaluations helpful, it was their administrator.

Some of the teachers interviewed described the purpose of vocational teacher evaluations as a necessity to fulfill some requirement within the school system, rather than as a tool for improving their teaching ability. Two of the teachers interviewed said they had improved as a result of their evaluations, but the other teachers interviewed said their evaluations resulted in no change in their teaching. Teachers not gaining improvement from their evaluations described personal motivation, and staying current in their fields of education, as their source of improvement.

Teachers in the research sample believed that the primary purpose of any teacher evaluation should be the improvement of the teachers being evaluated. Teachers interviewed believed that if they became better teachers, their students would be more successful at learning the competencies being taught and finding employment in their specific vocational areas. Teachers believed that the outcome of an effective teacher evaluation should be specific, very positive, and should provide the teacher with a clear picture of how they were performing. Evaluations should be designed to tell teachers specifically what they need to do in order to improve their teaching ability.

Two of the teachers interviewed stated that evaluations should not be used to document teacher incompetence. One teacher interviewed suggested that a separate tool should be used for this purpose. One teacher interviewed suggested that an evaluation should be a positive tool, not a negative tool used for documentation of poor teaching which could lead to an incompetent teacher being fired. Eight teachers interviewed stated that an evaluation program should document competence and incompetence, and that it should be used as a tool to help get rid of incompetent teachers. All of the teachers responding in this way agreed that the evaluation tool should not be the only documentation needed to fire an individual, but should contain information of teacher competence that would be relevant if the employment status of a teacher was being reviewed.

Teachers were observed for evaluation purposes in the classroom and in the laboratory. Each teacher interviewed was certified in a vocational area, but taught in a slightly different environment. As an example, the curriculum and laboratory experiences in the Cosmetology Department at VS-JVSD are quite different when compared to the Agriculture Department. The teachers interviewed believed that both the classroom and the laboratory should be observed for the purpose of an evaluation. Some teachers interviewed

were more comfortable when teaching in the laboratory than in the classroom, but agreed that their teaching ability in the classroom should also be evaluated.

The teachers interviewed commented that in their laboratory settings, students were more actively engaged and therefore, they perceived their teaching ability would be perceived to be more positive than in a classroom setting. Some teachers interviewed stated that teaching in their laboratories was their strong point, and wanted to be evaluated in the laboratory. All of the teachers interviewed reported a felt need for both their classroom and their laboratory teaching to be observed.

Many of the teachers interviewed were required to make business and home visits as part of their teaching responsibilities. In addition, some teachers were required to fulfill youth group obligations. All of the teachers utilized field trips and guest speakers as teaching methods. Teachers with responsibilities in these unique situations stated that their evaluations should include an observation of activities which extended beyond their normal hours in school.

Teachers were asked to describe their attitudes toward the specific time that they were to be observed for the purpose of vocational teacher evaluations. Teachers were asked whether or not they would be in favor of choosing the day and the lesson they would be teaching for their formal evaluation. All but one of the nine teachers responded that it really made no difference. These teachers believed that allowing them to choose the day and time they would be evaluated might "cheapen" the evaluation method.

Some teachers commented that there would be even more pressure on the teacher being evaluated. Teachers responding in this way perceived that there would be tremendous pressure to have lessons that were absolutely perfect. Other teachers interviewed in this study reported that being able to choose what they were teaching for their formal evaluation would allow them to choose a lesson which they were comfortable teaching. In this way, their true teaching ability would be observed.

Teachers were asked to describe their attitudes towards how often they should be evaluated. All nine of the teachers were in favor of more frequent observations. Some teachers suggested that vocational teacher evaluations should be conducted at least once a week while others suggested at least once a month. Teachers in this study suggested that more frequent visitations from the evaluator would provide a clearer picture of how well the teacher was actually performing. None of the teachers interviewed believed that the current system of two formal evaluations per year was sufficient for improving their teaching ability.

The teachers interviewed also believed that teachers with less than five years of experience should be evaluated more often than experienced teachers. Research participants agreed that no matter what the experience level of the teacher being evaluated, there was definitely a need for observation and evaluation, however, if the true purpose of the evaluation was to help teachers improve, then evaluations should be more frequent for less experienced teachers.

Teachers were asked how long they thought administrators should observe them for the purpose of their formal teacher evaluation. All of the teachers interviewed were in favor of more frequent evaluation observations from their administrator. Some teachers described a system that incorporated five to ten visits from the evaluator, with each visit lasting anywhere from five to fifteen minutes. A majority of the teachers were in favor of an evaluation that lasted all day. The teachers believed that the evaluator should be able to see how the teacher interacts with his/her students from the moment they walk in till the moment the students leave for the day. Most of the teachers agreed that this type of evaluation would be too much of a burden on the evaluator and would take time away from other administrator responsibilities. Teachers reported that more visits to their classrooms and laboratories throughout the year would provide a better picture of their abilities.

All of the teachers were in favor of having more than one evaluator observing them at the same time. Several of the teachers interviewed suggested an evaluation program that required a simultaneous observation by a peer within their teaching area and an administrator. Teachers were in favor of the two evaluator system because the observation would be from two perspectives rather than just one.

Teachers in the study expressed concern about the qualifications of the administrators who were conducting their evaluations. The vocational areas that were represented by the research sample were very diverse. Many of the teachers stated that their administrator was competent in teaching methods and strategies, but fell short when it came to subject matter in their particular field of study. Teachers were in favor of having somebody within their own field of study helping with formal evaluations.

Teachers were asked to describe their attitudes toward self-evaluation. Teachers had many differing responses when asked how difficult it wa to evaluate themselves. Responses ranged from very easy, to extremely difficult. Some teachers stated they were too hard on themselves when they were asked to evaluate their own teaching ability, while other teachers believed that evaluating their own teaching was very easy. Each teacher interviewed had a very specific description of what a quality teacher should be, and each teacher was able to compare themselves to that model teacher.

Teachers were asked to describe how they would feel about being evaluated by their students. The majority of the teachers interviewed stated that they already used some form of informal evaluations from their students to help them determine if they were being effective teachers. Some of the teachers did not like the thought of being formally evaluated by their students. These teachers were concerned that their students were not mature enough to provide a quality evaluation, or that their students might be negative because of personal conflicts they experienced with the teacher.

All nine teachers agreed that even with immaturity and the lack of objectivity in a student evaluation, there would be some value in their students' perspectives. Teachers described their feelings toward being evaluated by advisory board members. Some teachers suggested that advisory board members would strengthen their evaluation from a technical standpoint, while others explained that their advisory board members already have helped

them to improve their technical skills. The teachers in this study perceived that being evaluated by other teachers from their school district would be beneficial. Teachers suggested that more experienced teachers would be willing to provide a peer review of a teacher's ability. It was also suggested that teachers with experience in the same program area of the teacher being evaluated, would provide a better evaluation.

All of the teachers interviewed were asked if they would volunteer to evaluate other teachers for the purpose of formal evaluation. All nine of the teachers interviewed said they would be willing to volunteer. Some of the teachers would agree to volunteer only if they were able to observe teachers outside of their school district, while other teachers stated that having the opportunity to observe their peers, in their own building, would help them improve their own teaching ability. Teachers had mixed feelings about being evaluated by parents and other community members. All of the teachers interviewed encouraged parents to visit their program areas and observe the classroom and laboratory activities. When faced with the question of these parents and community members evaluating them, the teachers expressed concern about objectivity and the lack of understanding many parents have about the responsibilities of teaching in a vocational program.

The teachers were each able to describe what they thought was the most difficult challenge an evaluator had when observing teachers for the purpose of formal evaluations. A common response among the teachers interviewed was, "Remaining objective during the evaluation process." Some teachers reported that keeping personal differences out of the evaluation program was a very difficult task. Some teachers stated that the biggest challenge facing the evaluator was the lack of information they gained by only observing a teacher for a short period of time. These teachers believed that the criteria on the evaluation form required much more information than the evaluator could gain by observing the classroom or the lab for only thirty minutes.

All of the teachers interviewed were happy with the way results of their evaluations had been reported to them. In their evaluation program, teachers were given an opportunity to rate themselves for each of the specified teaching skills listed on their evaluation form. Teachers rated themselves after seeing the rating they were awarded by the administrator. Teachers then had an opportunity to discuss the results in a confidential meeting with their administrator. The teachers interviewed were very happy with the way their results were presented to them and were glad to have the opportunity to discuss the observation period with the evaluator. Teachers said they were able to explain things that might have influenced the administrator to give them a lower rating score, and to provide more in depth information related to areas that were not fully observed during the evaluation period.

Teacher responses were in agreement that there was some stress when their administrators came in the classroom or laboratory for the purpose of teacher evaluation. The male teachers interviewed described the nervousness as mild, but present, while the female teachers interviewed described more anxiety. The female teachers stated they were anxious because they felt a need to make sure that nothing went wrong.

In a confidential meeting following the evaluation observation, one teacher asked the evaluator to become more interactive with the class and reported that he had no anxiety with his evaluations since. The changes the one teacher suggested to the evaluator were: 1) make less notes on the yellow pad during the observation; 2) become active in the class by asking questions and participating in lab activities; and, 3) show emotions and gestures throughout the class.

When the teachers were asked if their teaching was different while they were being evaluated, they responded very differently. Some teachers believed that their teaching style and mannerisms were very different while they were being observed. Some teachers described their teaching ability as very similar to when there was no observer, but they were somewhat more conservative and were very careful not to make any mistakes.

The highly experienced teachers reported their teaching was no different while they were being evaluated. The teachers in the VS-JVSD were notified of their upcoming evaluation at least three weeks prior to the evaluation observation. A formal letter was placed in the teacher's mailbox with a specified time period in which they would be evaluated. When asked their opinions about this method of informing teachers about their evaluations, most teachers commented it was fine. Some teachers believed that informing them three weeks in advance, gave them the opportunity to mentally and physically prepare to make sure they were ready. Some teaches said they wouldn't mind being evaluated without prior notice.

More immediate feedback with face-to-face collaboration between the evaluator and the teacher was a suggestion from seven of the teachers interviewed. All nine of the teachers were in favor of continuing the face-to-face discussion of their evaluation results, but seven of the teachers interviewed reported that the results should be reported within two days of the observation session. Teachers agreed that having the opportunity to explain certain details about the observation period was beneficial, but should occur sooner.

Teachers were asked to describe their perceptions about reporting of results. The teachers interviewed in this study were content with the way results were reported to them in their current evaluation process. Teachers offered suggestions for improving the reporting process. The teachers agreed that results must be as positive as possible and there should always be something reported that a teacher did well. The teachers stated that the things not done well during an observation period should also be reported. Teachers agreed that any criticism of their teaching ability should be presented in a positive way and should be accompanied with specific suggestions for improvement. The teachers also suggested that the administrator provide resources for improving teaching. Suggestions from the research participants included: books; magazines; resource people; college courses; and, workshops.

Conclusions and Recommendations

Conclusions

1. The main purpose of vocational teacher evaluations in the VS-JVSD should be to

improve teacher performance by pointing out areas of weakness and strength and offering detailed suggestions for improvement.

2. Improvements by the research participants were intrinsically motivated and were not credited to the results of any past vocational teacher evaluation.

3. Teachers interviewed agreed that it may not be the system or the process that makes evaluations beneficial, as much as it may be the administrator or the person completing the evaluations.

4. Teachers were in favor of having the opportunity to rate themselves on their summative evaluation form after seeing the rating awarded to them by their evaluator.

5. Evaluators that were active in the lesson while they were observing the teachers reduced teacher anxiety and made the teacher more comfortable.

6. Teachers agreed that observation for evaluation should be constant.

7. Teachers need structure and frequent interaction with their principles. Teachers are motivated to do well when they feel ownership in the system being used to evaluate them (Wagner & Hill, 1996).

8. The teachers interviewed stated that they should be involved in the development of the evaluation program used in their school.

9. Teachers interviewed agreed that some administrators were not qualified to be evaluating their particular field of education.

10. Many of the teachers interviewed used informal evaluations from their students as a method to improve their teaching performance.

11. Teachers believed that any feedback from a formal vocational teacher evaluation should be immediate, should be constructive, and should be as positive as possible.

Recommendations

The recommendations listed are based on the conclusions of the study. These recommendations will be presented to the VS-JVSD Board of Education and to the VS-JVSD Teacher Evaluation Review Committee for incorporation into the development of a new evaluation program.

1. The primary purpose of vocational teacher evaluations should be to improve teacher performance. Therefore, an evaluation tool should be developed that helps teachers understand specifically what they need to improve and provide detailed suggestions for professional development.

2. Evaluation programs should be designed around more frequent visits to the classroom and/or laboratory throughout the school year; thus a process of evaluation should be developed that allows the evaluator the opportunity to make 10 or 15, 15-minute, visits throughout the school year, rather than just two, one-half hour, visits.

3. The evaluation program should be continuing and should include all aspects of each teacher's specific responsibilities. Teachers with duties and responsibilities outside of the class and the laboratory should have these responsibilities observed as well.

4. If the current number of evaluations will be maintained, observations should be completed by two people during the same period of time. One administrator, and one person with experience in the particular field of study of the teacher being evaluated.

5. Teachers in the district should have input into the development of the evaluation program. A new evaluation tool should be developed that incorporates the attitudes of the vocational teachers in the district.

6. Teachers with five or less years of experience should be formally evaluated a minimum of four times each year, whereas experienced teachers with six or more years of experience should be evaluated only two times each year.

7. Follow up meetings between the evaluator and the teacher should be continued to allow teachers the opportunity to explain aspects of their evaluation that may not have been observed by the evaluator.

8. The evaluation process should continue to allow teachers to evaluate themselves using the same criteria the evaluator(s) used. These criteria should be agreed upon between the teachers and the administrators in the school district prior to the evaluation occurring.

9. The administrator completing the evaluation should play an active role in the classroom or laboratory during the observation. Examples include: asking questions; working with students; and, offering their own personal experiences.

10. Evaluation results should include immediate feedback, should be constructive, and include as many positive aspects as possible. Evaluation reports should detail the strengths and weaknesses of the teacher being evaluated, and offer detailed suggestions for improvement in areas of weakness.

References

Atkins, A.O., (1996). Teacher's Opinions of the Teacher Evaluation Process. (ERIC Document Reproduction Service No. ED 398 6280.

Haertel, E., (1992). Performance measurement. Encyclopedia of Educational Research, 3, 984-977.

Hedges, L., (1996). Personal Interview session on July 17th, 1996 at the Ohio State University.

Leach, J. A., & Evans, J.A., & Whetstone, T.S., (1992). Demographic and psychological characteristics of vocational-technical instructors rated as excellent in business and industry and in postsecondary and secondary schools. Journal of vocational Education Research, 17, 71-100.

Ornstein, A. C., & Berlin, B., (1995). Successful teachers: What we know about them. The High School Journal, Feb/March, 164-168.

Shepard, L. A., (1992). Teacher professionalism. Encyclopedia of Educational Research (6th Edition), 4, 1363-1364.

Stufflebeam, D. L., (1988). The Personnel Evaluation Standards. Newbury Park, California: Sage Publications.

Tuckman, B. W., (1995). Assessing effective teaching. Peabody Journal of Education, 70, 127-137.

Wagner, N. C., & Hill, M. S., (1996). Linking Teacher Evaluation, Professional Growth, and Motivation: A Multiple-Site Case Study. (ERIC Document Reproduction Service No. ED 404 331).

White, R., (1995). Student Teacher Communications Committee. Available: http://www.primenet.com/~rwhite/stcc.

Attitudes of Vocational Teachers Towards Teacher Evaluation

A Critique

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Teacher evaluation is an ongoing concern of teachers and administrators. The process often involves a great deal of subjective judgment with limited observation. This study delves into teacher attitudes toward the process. The researchers are to be commended for the energy they put into interviewing and compiling responses. This level of investigation is invaluable.

The impact of this study is twofold. It can contribute to an improved evaluation process at the Vanguard Sentinel-Joint Vocational School District. Attitudes surfaced concerning the mechanics of evaluation should alert VS-JVSD administrators and initiate discussions for improving the process. The study also serves to identify attitudes toward evaluation that can be used elsewhere and in further research.

This study does contribute to the body of knowledge in vocational education. A solid theoretical framework was developed for this study. The attitudes expressed by the respondents were probably not new to evaluators or researchers. The responses did, however, create a picture of evaluation in this particular school's vocational education program.

The research methods were appropriate but the conclusions and recommendations were somewhat misleading. The objectives of the study were clearly stated and the interview process was an appropriate means to collect the detailed data sought. While this was a descriptive study, it is difficult to imagine that the data adequately described the attitudes of the entire vocational program in the school. Only nine of 75 teachers (12 percent) were interviewed. These nine were self-selected by volunteering. Generalizing the results is a problem in this study. Yet, the conclusions and recommendations are written as though the data represent the population. Perhaps this study should be treated more as a case study where concerns are surfaced but not attributed to the population. The views of only nine self-selected respondents probably should not drive changes in the process without further discussion or investigation.

In summary, this study is very useful. School districts will continue to struggle with evaluation of teachers. Who does the evaluation? How often? For what purpose should the results be used? How can evaluations be made more objective? Administrators will continue to wrestle with these and many more very real questions. This study sheds some light from nine concerned teachers in a specific school district. It would serve teacher evaluators well to take a close look at this study and use the finding in reflecting on their own procedures.

THE IMPACT OF PARTICIPATING IN FRESHMEN INTEREST GROUPS AND AGRICULTURAL YOUTH ORGANIZATIONS ON AGRICULTURE STUDENTS' ACADEMIC PERFORMANCE AND RETENTION

Introduction

"Nothing is permanent but change." This quote by the Greek philosopher, Heraclitus, presents a holistic summary of agriculture over the past century. It also provides an accurate projection of what agriculture is likely to experience in the new millennium.

Change has been a defining characteristic of agriculture. In 1950, 17% of the population in the United States lived on a farm, whereas today, less than two percent of the population resides on a farm. Yet, agricultural production has increased by 150% over the past 45 years (National Research Council [NRC], 1995). Furthermore, farming is not the only segment of agriculture that has experienced change. The food, fiber, and natural resource sectors currently employ 18% of the U.S. population and contribute 16% of total "value added" endeavors in the processing, marketing, and distribution of agricultural products (NRC, 1995). Through research, development, and education, colleges of agriculture across the nation have contributed greatly to this growth in productivity (NRC, 1996). However, with change comes challenge; and colleges of agriculture must face the challenges of providing education for the human resource base in a rapidly growing, increasingly global, and highly technological food, fiber, and natural resource system (NRC, 1996).

Possibly, the most important challenges facing colleges of agriculture today involve recruiting, retaining, and educating high caliber individuals who are academically prepared to function in a rapidly changing food, fiber, and natural resource industry. Goeker, Coulter, and Stanton (1995) predicted that at the turn of the millennium a shortfall of almost four percent would exist between employment opportunities and available graduates in food and agricultural sciences and cooperating fields. The previous prediction supported Russell's assertions of an impending "brain drain" in agriculture, or more specifically, a lack of qualified individuals with an agricultural background or experience (Russell, 1993). In addition to changing industry demands, colleges face great monetary investments dependent upon the academic success and degree completion of their students. With rising costs of education and depleting sources of funding, loss of students in colleges of agriculture translates to significant losses of instructional dollars (Dyer, Lacey, & Osborne, 1996). To remain viable, colleges of agriculture must meet these challenges by discovering ways of predicting the academic success and ensure the academic retention of its students.

In studying the complex phenomenon of education, Cruikshank (1990) suggested using theoretical models such as those developed and tested by Dunkin and Biddle (1974). The theoretical framework for this study was derived from an adaptation of Mitzel's Model of teaching, as presented by Dunkin and Biddle (1974). In their model, Dunkin and Biddle suggested that the study of teaching and learning involve four categories of variables: presage, context, process, and product (Figure 1).

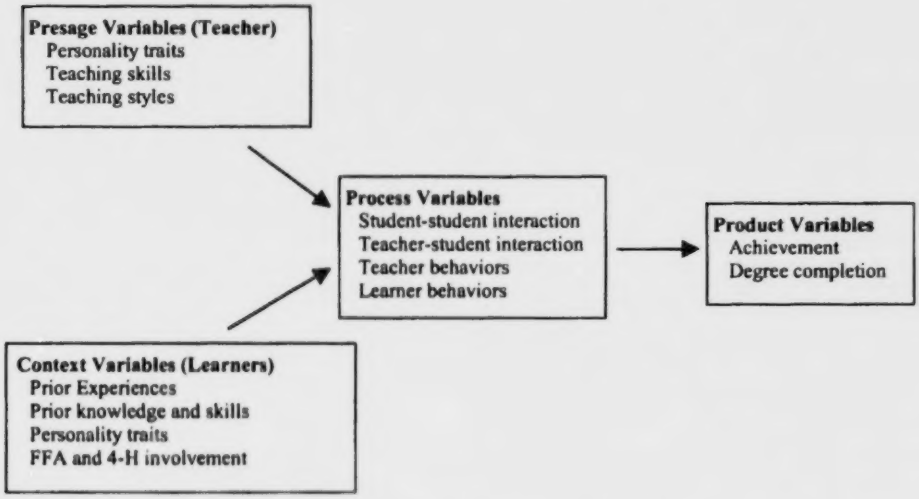

Figure 1. Theoretical Model for the Study of Classroom Teaching

Presage variables include those that influence teachers and their teaching behaviors (i.e., those things that teachers contribute to the learning process). Context variables are those that students contribute. Context variables include the background of learners, their prior knowledge and skills, their attitudes toward learning, and their involvement in organizations and activities that may potentially shape the nature of their personality and skill development, such as 4-H and/or FFA. Process variables describe the interaction of teacher and learner behaviors in the teaching-learning process. Examples include institutional activities and programs that support teacher-student or student-student interactions, such as learning communities. Finally, product variables include the knowledge and skills gained or attitudes modified as a result of teaching and learning.

Involvement in agricultural youth organizations such as FFA and 4-H are important context variables that have been shown to influence educational outcomes such as student achievement, skill attainment, and even student retention in colleges (Dyer & Breja, 1999; Dyer, Lacey, & Osborne, 1996). At an ever-increasing rate, students who enter colleges of agriculture are deficient in agricultural experience (Dyer, Lacey, & Osborne, 1996; Scofield, 1995). Dyer, Lacey, and Osborne noted that colleges of agriculture could select students with the next best thing: experience in high school agriculture classes, 4-H, and FFA (1996). Participation in 4-H was shown to influence the outcomes of achievement and life skill development (Fleming-McCormick & Tushnet, 1997; Junge, 1994; Seevers & Dormody, 1994; Thomas & Ladewig, 1985). FFA involvement has been shown to have a positive relationship with student achievement for high school students (Pruckno & Miller, 1987).

Another important influence on the products of teaching and learning is the educational setting or the academic institution in the teaching and learning process. Not all

learning takes place in the classroom (Dewey, 1938). Institutions of higher education nationwide have developed the concept of learning communities in response to the current needs for enhanced academic performance, as well as improved rates of student retention (Hill, 1990; University of Missouri, 1996). Lenning and Ebbers (1999) defined learning communities as small subgroups of learners organized by common purpose and mode of interaction.

Learning communities are organized in a variety of approaches, such as freshmen interest groups, learning clusters, federated learning communities, and coordinated studies communities (Lenning & Ebbers, 1999; Tinto & Goodsell, 1994). Organized as clusters of students with common characteristics, similar academic interests, enrolled in similar courses, and living together in a residence hall, Freshman Interest Groups (FIGs) in particular have been noted to increase students' levels of academic performance and retention in postsecondary institutions (Hill, 1985; Lenning & Ebbers, 1999; Pike, 1999; Tinto & Goodsell, 1994; University of Missouri, 1996). Pike, Schreoder, and Barry (1997) concluded that student involvement in residential learning communities improved educational outcomes by fostering increased levels of student-student and faculty-student interactions, as well as enhanced student involvement in coursework. While a strong literature base supports FIGs as enhancing the outcomes of teaching and learning, research involving FIG participation among college of agriculture students is lacking. Specifically, can involvement in FIGs be utilized as a process variable to predict the product variables of student achievement and student retention in colleges of agriculture?

The current literature base is helpful in identifying context variables that can serve as predictors of student retention or life skill attainment. However, little research exists regarding the effectiveness of those context and process variables, specific to agriculture students, in predicting students' academic performance, specifically at the college level. Can selected context variables (4-H or FFA involvement) be a distinguishing characteristic on the academic performance and retention of students in colleges of agriculture?

By targeting specific variables that have the potential to enhance academic performance and student retention, colleges of agriculture have an opportunity to shape the changing face of agriculture, just as they have shaped scientific advancements and management practices in the past. While the population in the U.S. is on the rise, the population of individuals possessing experience with or a background in agricultural endeavors is in rapid decline (NRC, 1995). Colleges of agriculture across the nation must find ways to respond to the challenges of a population and a workforce in the midst of an agricultural "brain drain." Consequently, a research base is needed to identify characteristics that can be used in predicting the academic performance and retention of students in colleges of agriculture.

Purpose and Objectives

The purpose of this study was to compare the influence of participation in Freshmen Interest Groups (FIGs) and involvement in agricultural youth organizations on academic performance and retention of freshmen in the College of Agriculture, Food and Natural

Resources at the University of Missouri. The following research questions were used to guide the study:

1. Did college of agriculture students who participated in a Freshmen Interest Group (FIG) have greater academic success than those students who did not participate in a FIG?

2. Did college of agriculture students who participated in agriculture youth organizations (FFA and/or 4-H) have greater academic success than students who did not participate in agricultural youth organizations?

3. Did college of agriculture students who participated in a Freshmen Interest Group (FIG) have a greater chance of returning for their sophomore year than students who did not participate in a FIG?

4. Did college of agriculture students who participated in agriculture youth organizations (FFA and/or 4-H) have a greater chance of returning for their sophomore year than students who did not participate in agriculture youth organizations?

For the purpose of statistical analysis, the research questions were posed as null hypotheses.

HO_1: There was no difference in the academic performance of students who participated in a FIG and those who did not participate in a FIG, when controlling for the variance associated with ACT score.

HO_2: There was no difference in the academic performance of students who had prior involvement in agricultural youth organizations and those who did not have prior involvement in agricultural youth organizations, when controlling for the variance associated with ACT score.

HO_3: There was no difference in the retention of students who participated in a FIG and those who did not participate in a FIG.

HO_4: There was no difference in the retention of students who had prior involvement in agricultural youth organizations and those who did not have prior involvement in agricultural youth organizations.

Procedures

The target population for this ex post facto study was freshman entering the College of Agriculture, Food and Natural Resources at the University of Missouri in the Fall of 1997 and 1998 ($\underline{N} = 664$). The accessible sample consisted of intact groups of freshmen enrolled in a college learning and development course in the Fall of 1997 and 1998 ($\underline{n} = 442$).

Analysis of Data

Students' academic performance was measured by their cumulative grade point at the completion of the freshmen academic year. Retention was based on enrollment status at the beginning of the first semester of the sophomore year. Descriptive statistics were generated for composite ACT score as well as cumulative GPA at the completion of the freshmen year. Research hypotheses one and two were analyzed using analysis of covariance (ANCOVA). An ANCOVA procedure was used because there were between group differences of ACT scores. Research hypotheses three and four were tested using the Chi Square test for association. An alpha level of .05 was established a priori for all statistical tests.

Results

The mean cumulative GPA for students who participated in a FIG was 2.9, whereas the mean cumulative GPA for students who did not participate in a FIG was 2.7 (Table 1). Furthermore, the mean composite ACT score for students who participated in a FIG was 25.7, whereas the mean ACT score for students who did not participate in a FIG was 23.8.

Table 1
Descriptive Data for Academic Performance and ACT Score for Freshmen Interest Group (FIG) Participation

	Participated (n=123)			Did Not Participate (n=306)		
	M	SD	Range	M	SD	Range
Cumulative GPA	2.9	.8	.6-4.1	2.7	.7	.3-4.0
ACT score (covariate)	25.7	3.6	18-33	23.8	4.0	15-34

The first null hypothesis was developed to ascertain if there was a difference in the academic success of students who participated or did not participate in a Freshmen Interest Group (FIG). The results of the analysis of covariance (ANCOVA) procedure are reported in Table 2. The main effect, participation in a FIG, did not produce a significant difference in students' academic performance when controlling for the influence on academic performance associated with ACT score. Therefore, the hypothesis asserting that there were no differences in academic performance between students who participated in a FIG and students who did not participate in a FIG was not rejected.

Table 2
Analysis of Covariance of FIG Participation by ACT Score

Source	Df	MS	F	p
Intercept	1	7.50	17.92	.00
Covariate (ACT score)	1	40.52	96.84	.00
Main effect (FIG participation)	1	5.87	.001	.97
Error	422	.42		

The mean cumulative GPA for students who had been involved in an agriculture youth organization was 3.1, whereas the mean cumulative GPA of students who had not been involved in an agriculture youth organization was 2.6 (Table 3). The mean composite ACT score for students who participated in agricultural youth organizations was 25.4, whereas the mean composite ACT score for students who did not participate in an agriculture youth organization was 23.7.

Table 3
Descriptive Data for Academic Performance and ACT Score by Involvement in Agricultural Youth Organizations

	Involved (n=158)			Not involved (n=271)		
	M	SD	Range	M	SD	Range
Cumulative GPA	3.1	.6	.9-4.1	2.6	.7	.3-4.1
ACT score (covariate)	25.4	3.8	17-34	23.7	4.0	15-33

The second null hypothesis was developed to ascertain if there was a difference in the academic success of students who had or did not have prior involvement in agricultural youth organizations. The results of the ANCOVA procedure are reported in Table 4. The main effect, involvement in agricultural youth organizations (FFA and/or 4-H), produced a significant difference in students' academic performance when controlling for the variance associated with ACT score. Therefore, the hypothesis asserting that there was no difference between the performance of students who were involved in agricultural youth organizations and students who were not involved in agricultural youth organizations was rejected.

Table 4
Analysis of Covariance of Involvement in Agricultural Youth Organizations by ACT Score

Source	df	MS	F	p
Intercept	1	12.28	30.92	.00
Covariate (ACT score)	1	33.06	83.25	.00
Main effect (FIG participation)	1	9.02	22.71	.00
Error	422	.40		

The third null hypothesis sought to determine if a difference existed in the retention of students who participated in a FIG and those who did not participate in a FIG. Results of the Chi Square test of association are presented in Table 5. Regarding the 317 freshmen who did not participate in a FIG, 43 were not retained for their sophomore year, whereas 274 were retained for enrollment in their sophomore year. Regarding the 125 freshmen who did participate in a FIG, 12 were not retained and 113 enrolled for their sophomore year. Pearson's Chi Square yielded a value of 1.29, which was not significant (p=.255). Thus, the hypothesis asserting that there were no differences in retention between students who participated in a FIG and students who did not participate in a FIG was not rejected.

Table 5
Contingency Table by Retention and FIG Participation

	Retained for Sophomore Academic Year		
	No	Yes	Total
Did Not Participate in a FIG	43 (13.6%)	274 (86.4%)	317
Participated in a FIG	12 (12.4%)	113 (90.4%)	125
Total	55 (12.4%)	387 (87.6%)	442

χ^2 (1, n=442) = 1.29, p > .05

The fourth null hypothesis sought to determine if a difference existed in the retention of students who had or did not have prior involvement in agricultural youth organizations. Results of the Chi Square test of association are presented in Table 6. Regarding the 284 students who did not have prior involvement in an agriculture youth organization, 46 were not retained and as 238 did return for the fall of their sophomore year. Regarding the 158 freshmen that had been involved in an agriculture youth organization, 9 were not retained and 149 were enrolled for their sophomore year. Pearson's Chi Square yielded a value of 10.73, which was significant (p = .001). Thus, the hypothesis asserting that there were no differences in retention between students who were involved in agricultural youth organizations and students who were not involved in agricultural youth organizations was rejected.

Table 6
Contingency Table by Retention and Agriculture Youth Organization Participation

	Students Retained for Sophomore Enrollment		
	No	Yes	Total
Not Involved in Ag Youth Organizations	46 (16.2%)	238 (83.8%)	284
Involved in Ag Youth Organizations	9 (5.7%)	149 (94.3%)	158
Total	55 (12.4%)	387 (87.6%)	442

χ^2 (1, n=442) = 10.28, p< .05

Conclusions and/or Recommendations

Students who participated in Freshmen Interest Groups (FIGs), while not markedly different in performance measures associated with cumulative GPA, did possess slightly higher ACT scores than those who did not participate in a FIG. When utilizing ACT score as a covariate to equate the two groups on performance measures, participation in a FIG was not found to be a significant process variable in its influence on academic performance. Additionally, participation in a FIG was not found to possess a significant association with retention for the sophomore year. This finding contradicts prior studies (Hill, 1985; Lenning & Ebbers, 1999; Pike, 1999; Tinto & Goodsell, 1994; University of Missouri, 1996) indicating the positive influences of FIG participation on a student's academic performance and retention at the postsecondary level. While research has pointed toward FIGs as an effective solution for increasing students' retention and academic performance across universities as a whole, college of agriculture students may not experience the effects of FIG participation as immediately as do students in other colleges. Further quantitative as well as qualitative research is needed to determine the direct effects of FIG participation specific to college of agriculture students.

Students who were involved in agricultural youth organizations possessed important differences in performance measures associated with cumulative GPA. This finding is consistent with Dyer et al.'s (1996) findings, indicating that students who have been involved in FFA and/or 4-H at the high school level performed better in colleges of agriculture than those who did not have prior involvement in these agricultural youth organizations. The practical implications of this difference form striking distinctions between those who are selected and those who are excluded from college admission and/or scholarships based upon cumulative GPA. In addition, students who were involved in agricultural youth organizations scored approximately two points higher on the ACT. Yet, when utilizing ACT score as a covariate to equate the groups on performance measures, involvement in agricultural youth organizations was still found to have a significant influence on cumulative GPA.

Additionally, involvement in agricultural youth organizations was found to have a significant association with retention for the sophomore year. This finding was consistent with previous research indicating the influence of involvement in FFA and 4-H as an important indicator for retention in a college of agriculture (Dyer et al., 1996; Dyer & Breja, 1999). Thus, prior experiences such as involvement in agricultural youth organizations, can

serve as significant context variables in their influence on the product variable of academic performance and retention in a college of agriculture. The implications of this finding are twofold. First colleges of agriculture, in order to ensure for the success of their students, should continue their efforts to recruit individuals with prior experiences in agricultural youth organizations. Finally, colleges of agriculture should seek continued efforts in training quality individuals in the fields of agricultural education as well as extension education in order to maintain the quality FFA chapters and 4-H clubs from where this successful pool of future college of agriculture students may be selected. Continued quantitative as well as qualitative studies are warranted in order to further indicate presage, context, and process variables that can enhance the products of student achievement and retention in colleges of agriculture.

References

Cruikshank, D.R. (1990). Research that informs teachers and teacher educators. Bloomington, IN: Phi Delta Kappa Educational Foundation.

Dewey, J. (1938). Experience and education. New York: Macmillan Publishing.

Duncan, M.J. & Biddle, B.J. (1974). The study of teaching. New York: Holt, Rinehart, and Winston.

Dyer, J.E., & Breja L. M. (1999). Predictors of student retention in colleges of agriculture. Proceedings of the 53rd Annual Central Region Research Conference in Agricultural Education. St. Louis, MO, 93-100.

Dyer, J.E., Lacey, R., & Osborne, E.W. (1996). Attitudes of University of Illinois College of Agriculture freshmen toward agriculture. Journal of Agricultural Education 37(3), 43-51.

Fleming-McCormick, T. and Tushnet, N.C. (1997). Does an urban 4-H program make differences in the lives of children? Paper presented the Annual Meeting of the American Educational Research Association, New York, NY. Apr. 8-10.

Goeker, A.D., K.J. Coulter, & M. Stanton. 1995. Employment Opportunities for College Graduates in the Food and Agricultural Sciences: 1995-2000. West Lafayette, Ind.: Purdue University.

Hill, P. (October, 1985). The rationale for learning communities and learning community models. Paper presented at the Inaugural Conference on Learning Communities of the Washington Center for Improving the Quality of Undergraduate Education, Olympia, WA.

Junge, S. (1994). Helping youth at risk: 4-H and cooperative extension venture into child care. California Agriculture. 48(7), 27-30.

Lenning, O.T., & Ebbers, L.H. (1999). The powerful potential of learning communities: Improving education for the future. (ASHE-ERIC Higher Education Report, Vol. 26, No. 6.) Office of Educational Research and Improvement, Washington, D.C.

National Research Council, Committee on the Future of the Colleges of Agriculture in the Land Grant System. (1995). Colleges of agriculture at the land grant universities: A profile. Washington, D.C.: National Academy Press.

National Research Council, Committee on the Future of Land Grant Colleges of Agriculture, Board on Agriculture. (1996). Washington, D.C.: National Academy of Sciences

Pike, G.R. (1999). The effects of residential learning communities and traditional residential living arrangements on educational gains during the first year of college. Journal of College Student Development. 40(3), 269-284.

Pike, G.R., Schroeder, C.C., & Berry, T.R. (1997). Enhancing the educational impact of residence halls: The relationship between residential learning communities and first-year college experiences and persistence. Journal of College Student Development. 38(6), 609-621.

Pruckno, K.G., & Miller, L.E. (1987). Selected Ohio vocational agriculture students: Their attributes, vocational objectives and motivators for enrollment. (Summary of Research 42). Columbus: The Ohio State University, Department of Agricultural Education.

Russell, E.B. (1993). Attracting youth to agriculture: How colleges of agriculture can expand their role. Journal of Extension, 31(Winter), 13-14.

Scofield, G.G. (1995, March). College of agriculture new student profile. Proceedings of the 49th Annual Central Region Research Conference in Agricultural Education. St. Louis, MO, 1-10.

Seevers, B., & Dormody, T.J. (1994). Predicting youth life leadership skills development among senior 4-H members: A tri-state study. Journal of Agricultural Education. 35(3), 64-69.

A Student Success Story: Freshman Interest Groups at the University of Missouri-Columbia. [Abstract 1] (1996). Columbia, Missouri: Student Life Studies [Publisher] Retrieved October 5, 2000 from the World Wide Web: http://web.missouri.edu/~wwwsls/figs.html

Thomas, J.K., & Ladewig, H. (1985). Adult assessments of social learning experiences during adolescent participation in 4-H and other youth programs. (ERIC Document Reproduction Service No. ED 279 476).

Tinto, V., & Goodsell, A. (1994). A longitudinal study of freshman interest groups at the University of Washington. Washington, D.C.: Office of Educational Research and Improvement.

The Impact of Participating in Freshmen Interest Groups and Agricultural Youth Organizations on Agriculture Students Academic Performance and Retention

A Critique

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This study compares academic success and retention of students with prior FFA and 4H experience to students involved in freshmen interest groups. This is an interesting study that has moderate impact on agricultural education at the collegiate level. It confirms what we have been doing for many years, that is, recruiting students with high school FFA experience. On the other hand, it discounts the encouraging of college freshmen to become involved in freshmen interest groups. In doing so, this study apparently contradicts several other studies.

This is a sound study. It is based on a model including context variables such as student prior experiences as affecting achievement. Some ambiguity, however, exists in this report that make the study difficult to replicate. Were the data self reported or collected from a university data system? Several examples were given of freshmen interest groups. Were these examples listed for the respondents? How can the researchers assume that all respondents shared a relatively common definition of a FIG? How were students with both FFA and/or 4H involvement as well as FIG involvement treated?

The methods employed in this study were appropriate. The objectives and hypotheses were clearly stated. Data analysis was appropriate and test results were clearly illustrated. Reliability, however, was not addressed. There is reason to believe that some respondent questions arise. For example, how much participation is required to be considered involved? Does attending one learning cluster meeting qualify? Such questions can result in lowering the reliability of the data.

This study raises questions that will undoubtedly lead to further research. Five studies were cited contradicting the finding of no difference in academic performance between students involved in freshmen interest groups and those not involved. Was this study or setting uniquely different from the other five studies? Should college advisors dismiss freshmen interest groups as a waste of time and not advise students to participate? FFA and 4H students were found to perform better academically and more likely return to college for their sophomore year. Are these two variables related? What is unique about FFA and 4H students that make them different in these ways? Is FFA and 4H unique or can student high school involvement in other organizations also predict academic success and retention in college agriculture programs? The researchers are challenged with determining why FFA and 4H students succeed.

RELATIONSHIP BETWEEN LEARNING STYLE AND PERSONALITY TYPE OF STUDENTS MAJORING AND MINORING IN AGRICULTURAL EDUCATION AT THE OHIO STATE UNIVERSITY

Introduction/Theoretical Framework

An individual's learning process could go back to the concept that "different people respond differently to similar events" (Mischel, 1993, p. 4). If Mischel's concept is true, then it should be no surprise that one learner approaches the same learning situation (or event) from a different perspective than another learner. However, the question of how educators deal with different learning styles still remains. There have been several ways to assess learning to help answer the learning styles question. One way to assess learning was developed by Witkin and Goodenough (1981). An indicator of learning differentiation (style) is an "articulated field approach in cognitive functioning" (Witkin & Goodenough, 1981, p. 20). Other indicators include a sense of separate identity, an articulated body concept, and a tendency to use defenses such as isolation. These differences gave way to the concept of field dependence and field independence (Witkin & Goodenough, 1981).

The foundation of learning style as defined by field dependence and field independence started with Herman Witkin and his associates. Witkin's work began in the latter half of the 1940's. Witkin's earlier work didn't focus on education, but instead on pilot error. His goal was to determine "why certain pilots who lost sight of the ground mistakenly flew their planes upside down" (Garger & Guild, 1984, p. 9, 12). The goal of Witkin's research was to determine how the subjects defined the upright. Depending on how one interprets the visual environment was how Witkin categorized the subjects (Witkin, Moore, Oltman, Goodenough, & Cox, 1977a).

Through Witkin's research, it was learned that, "Learning styles are stable over time for each individual" (Garger & Guild, 1984; cited in Witkin, Moore, Oltman, Goodenough, Friedman, Owen, & Raskin, 1977b). That is, learning style does not change from day to day, week to week, or year to year. In addition, Witkin's research did not indicate intelligence. Witkin's learning styles focus on the "how" rather than the "how much," as opposed to an IQ test (Garger & Guild, 1984). The last point learned from Witkin's research was that learning styles were bipolar. However, each polarity had the ability to be adaptive and therefore, both poles were not inherently good or bad. The poles must be evaluated based on individual reactivity to different situations (Witkin & Goodenough, 1977c; Witkin et al, 1977a).

Witkin's learning styles theory is not the only way of assessing a learner's approach to a learning situation; personality types can also be used. Myers and Myers (1995, p. 1) stated that the theory of personality type is such that the "variation in human behavior is not due to chance; it is in fact the logical result of a few basic, observable differences in mental functioning." The Myers-Briggs Type Indicator (MBTI) can be used to identify the observable differences. Research with the MBTI includes areas such as counseling, psychotherapy, multiculturalism, health, stress, education, learning styles, and cognitive styles (Hammer, 1996).

The milestone of personality types began with Hippocrates and his four types of personalities: Sanguine, Choleric, Phlegmatic, and Melancholic. Most recently, Carl Jung wrote *Psychological Type*, which was translated into English in 1923. It was at this point that Briggs and Myers took Jung's research and developed the MBTI based upon four sets of opposites (True Colors Communication Group, 1998; Myers & Myers, 1995). Each of the MBTI opposites were just that, two polar differences in judgment, perception, preference towards inner and outer worlds and a preference towards judgment or perception as a way of life (Myers & McCaulley, 1985).

For the current study, scores on the GEFT operationally defined learning style and results on the MBTI operationally defined personality type. Myers and Myers (1995) stated that "type makes a natural and predictable difference in learning styles and in student response to teaching methods" (p. 139). In an article by Bargar and Hoover (1982), several implications were noted concerning typology and education. These implications made several references to learning style:

1. Differences in psychological type between teachers and students can lead teachers to misunderstand learning styles of students.
2. Conflicts in type can lead to difficulties in interpersonal communications among students and between students and teachers.
3. Type may affect students' preferences for instructional alternatives.
4. Type will affect teachers' preferences for instructional alternatives.
5. There is a relationship between psychological type and subject matter.
6. Identification of the function related to a student's schooling problem can aid teachers in working with students having difficulties.
7. The first approach to students' learning problems should probably be through their strengths, i.e., through the dominant and/or first auxiliary.
8. Improvement in schooling may mean dealing with the third auxiliary (inferior function) as well as strengthening the dominant or auxiliary. (Bargar & Hoover, 1982, p. 60-62).

From an agricultural standpoint, Bargar, Bargar, and Clark (1990) cited a 1989 study by Bargar, which indicated that the three most frequent types among agriculture students with aspirations to farm were ESTP, ESTJ, and ISTJ. Bargar, Bargar, and Clark also cited from a 1987 study by Homer and Barrett, that over half of the adult farmers in the study were either ESTJ or ISTJ.

Very few relational studies between the MBTI and the GEFT have been conducted. A study by Carey, Fleming, and Roberts (1989), found that there was an r coefficient of .38 between the S-N scale on the MBTI and the GEFT (p. 97). There was also an r coefficient of .38 between the J-P scale of the MBTI and the GEFT (p. 97).

Purpose and Objectives

The purpose of the study was to describe the relationship between learning style and personality type of students majoring and minoring in agricultural education at The Ohio State University from 1990 to 1999. The relationship studied was between the scores on personality type on the Myers-Briggs Type Indicator (MBTI) and the learning style score on the Group Embedded Figures Test (GEFT). To achieve the purpose of this study, the following research questions were developed:

1. What was the learning style distribution of students majoring and minoring in agricultural education at The Ohio State University from 1990 to 1999, as assessed by the Group Embedded Figures Test (GEFT)?

2. Out of the four opposites on the MBTI, which personality types (among each opposite) were most frequent among the students majoring and minoring in agricultural education at The Ohio State University from 1990 to 1999?

3. What were the personality type combinations of students majoring and minoring in agricultural education at The Ohio State University from 1990 to 1999, as assessed by the Myers-Briggs Type Indicator (MBTI)?

4. What was the relationship between the learning styles scores on the GEFT and the personality type score on the MBTI for students majoring and minoring in agricultural education at The Ohio State University from 1990 to 1999?

Methods/Procedures

The target and accessible population for the research was students majoring and minoring in agricultural education at The Ohio State University. The sample for the study consisted of students majoring and minoring in agricultural education at The Ohio State University enrolled in Agricultural Education 530, who were present the day the two instruments were administered. Both instruments (MBTI & GEFT) were administered to the students during a regular laboratory session of the Agricultural Education 530 course.

The validity of GEFT, which is considered a standardized instrument, has been determined by the use of its fellow instruments which also determined field dependence, such as the Embedded Figures Test (EFT) and the Rod and Frame Test (RFT). The GEFT correlation was determined to be .84 to .90, by Witkin, Oltman, Raskin, and Karp (cited in McCutcheon, 1997) when compared to the EFT. The correlation coefficient for the GEFT and the RFT was determined to be .55 also by Witkin, Oltman, Raskin, and Karp (cited in McCutcheon, 1997). For reliability, Witkin, Oltman, Raskin, and Karp (cited in Cano & Metzger, 1995) found the coefficient for the GEFT to be .82 using Spearman-Brown formulation.

Myers and McCaulley (1985) reported acceptable internal consistency for most adults using the test-retest method. Myers and McCaulley (1985) also reported consistency over

time. A chapter was dedicated to MBTI reliability in Myers and McCaulley's (1985) *Manual: A Guide to the Development and Use of the Myers-Briggs Type Indicator* and a chapter towards validity and reliability was set aside in Hammer's (1996) MBTI *Applications.*

Results/Findings

The overall GEFT mean score of the sample (n = 326) was 12.18. The mean indicated that the sample was field independent when compared to the national mean of 11.4 (Witkin, Oltman, Raskin, & Karp, 1971). More than half of the sample scored field independent (Table1).

Table 1. GEFT Score of Students (n = 326)

GEFT Field	Frequency	Percent
Field Dependent (0 – 11)	118	36.2
Field Independent (12 – 18)	208	63.8
Mean = 12.18		

For statistical purposes, each MBTI standard score was converted into a MBTI continuous score where the score alone would identify which opposite was preferred. The continuous score was based on a central score of 100 (Myers & McCaulley, 1985). For preference scores identifying extraversion, sensing, thinking, and judgment as the preferred type, the continuous score was converted by subtracting the calculated preference score from intuition, feeling, and perception as the preferred type, 100 was added to the calculated preference score (Myers & McCaulley, 1985). Therefore, a continuous scale score above 100 represented a preference towards introversion, intuition, feeling, or perception and a continuous scale score below 100 represented a preference towards extraversion, sensing, thinking, or judgment (Myers & McCaulley, 1985).

For the study, the sample of students majoring and minoring in agricultural education at The Ohio State University (n = 326), the mean score for the extraversion-introversion opposite was 93.67 (Table 2). The mean score for the sensing-intuition opposite was 83.51. The mean score for the thinking-feeling opposite was 90.59. The mean score for judgment-perception opposite was 92.80. Thus, the sample could be described as extraverted, sensing, thinking, and judgment (ESTJ) (Myers & McCaulley, 1985) (Table 2).

The mode for the MBTI distributions of the students majoring and minoring in agricultural education at The Ohio State University (n = 326) was ISTJ. The ISTJ group made up 19.6 percent of the sample, followed by 17.2 percent for ESTJ. For the sample, with no preference towards extraversion or introversion, the STJ group made up 36.8 percent. The next largest group was the ESFJs at 12 percent. The ENFP group followed with 7.1

percent of the total sample. The ESTP group was 6.1 percent of the total sample, followed by ISFJ at 5.8 percent, and ISTP at 5.5 percent. The other groups showed the following percentages: ENTJ at 4.6 percent, ESFP at 4.3 percent, ENTP at 4.0 percent. The INTP, INFP, ISFP, ENFJ, INTJ, INFJ groups were each 4 percent or less (Table 3).

Table 2. MBTI Opposite Scores (n = 326)

MBTI Opposite	Mean	Std. Dev.	Minimum	Maximum
Extraversion-Introversion	93.67	25.82	49	151
Sensing-Intuition	83.51	25.37	37	151
Thinking-Feeling	90.59	23.80	35	141
Judgment-Perception	92.80	28.20	43	161

Table 3. MBTI Combination Distribution (n = 326)

MBTI Combinations	Frequency	Percent
ISTJ	64	19.6
ISFJ	19	5.8
INFJ	5	1.5
INTJ	6	1.8
ISTP	18	5.5
ISFP	7	2.1
INFP	8	2.5
INTP	12	3.7
ESTP	20	6.1
ESFP	14	4.3
ENFP	23	7.1
ENTP	13	4.0
ESTJ	56	17.2
ESFJ	39	12.0
ENFJ	7	2.1
ENTJ	15	4.6
TOTAL	326	100.0

Analyzing the distributions in terms of function combinations (SF, ST, NF, NT), 48.4 percent were ST (Table 4). Those individuals included in the ST group were the ISTJ, ESTJ, ISTP, and ESTP. The next largest group of 24.2 percent were the SF group (ISFJ, ESFJ, ISFP, ESFP). The third largest group of 14.1 percent were the NT group (INTJ, ENTJ, INTP, ENTP), followed by the NF group (INFJ, ENFJ, INFP, ENFP) which consisted of 13.2 percent (Table 4).

Table 4. MBTI Function Combination Distributions (n = 326)

MBTI Function	Frequency	Percent
SF	79	24.2
ST	158	48.4
NF	43	13.2
NT	46	14.1

Of the students majoring and minoring in agricultural education at The Ohio State University (n = 326), the greater correlation between GEFT scores and MBTI scores was between the sensing-intuition scores and GEFT scores, with an r coefficient of .133 (Table 5). According to the Davis (1971) convention, this indicated a low association. Other more significant correlation scores were found between sensing-intuition and judgment-perception with an r coefficient of .388, which, according to Davis, indicated a moderate association. The thinking-feeling and sensing-intuition opposites r coefficient was .253, which according to Davis, indicated a low association (Table 5).

Table 5. Correlation between MBTI and GEFT (n = 326)

	GEFT	E-I	S-N	T-F	J-P
GEFT	1.000	-.008	.133*	.049	.117
E-I		1.000	-.192	-.197*	-.134*
S-N			1.000	.253*	.388*
T-F				1.000	.137*
J-P					1.000

* = Significance at the .05 level

Conclusions/Implications/Recommendations

Results Summary

The following Pearson product moment correlations were calculated among the MBTI opposites. Among the E-I and S-N opposites, a negative, low correlation was found. Based on the opposite continuous scores, the more extraverted a student was, the more intuitive that student tended to be, and vice versa. Among the E-I and T-F opposites, a negative, and low relationship was found. Based on the opposite continuous scores, the more extraverted a student was, the more feeling that student tended to be, and vice versa. Among the E-I and J-P opposites, a negative, low relationship was found. Based on the opposite continuous scores, the more extraverted a student was, the more perceptive the student tended to be, and vice versa.

Among the S-N and T-F opposites, a positive, low, and significant relationship was found. Based on the opposite continuous scores, the more sensing a students was, the more thinking the student tended to be, and vice versa. Among the S-N and J-P opposites, a positive, moderate, and significant relationship was found. Based on the opposite continuous scores, the more sensing a student was, the more judging the student tended to be, and vice versa. Among the T-F and J-P opposites, a positive, low, and significant relationship was found. Based on the opposite continuous scores, the more thinking a student was, the more judging that student tended to be, and vice versa.

Of the sample (n = 326) of students majoring and minoring in agricultural education at The Ohio State University between 1990 to 1999, the majority were field independent. The field independent students (63.8%) scored a 12 or greater on the GEFT. The remaining 36.2 percent were field dependent. The mean score of the sample was 12.18 which also indicated that the group was field independent.

Of the four opposites, the sample was extraverted, sensing, thinking and feeling, based on the continuous scores. Of the 16 MBTI type combinations, one-third of the sample was STJ, with little to no preference towards the extraversion-introversion opposite. In terms of the MBTI functions, slightly less than one half of the sample was sensing-thinking.

Using the GEFT to operationalize learning styles and the MBTI to oprationalize personality type, the following Pearson product moment correlations were calculated. No significant correlation between the E-I opposite and GEFT was found. The S-N opposite and GEFT score relationship yielded a low, significant association. A negligible, non-significant association was found between the T-F opposite and GEFT score. The correlation between the J-P opposite and GEFT score resulted in a low, and significant association.

Conclusions

In conclusion, the mean scores for the study indicated a preference of one type over the other in each opposite set. What should be realized is that, except for the S-N score, the opposite mean scores do not indicate much of a strength, which does not differentiate one type over the other within each opposite. According to the MBTI manual, a low continuous score indicates a slight preference towards a type (Myers & McCaulley, 1985). This translation of the score indicates that the items selected on the instrument were, for the most part, split among each type of an opposite (Myers & McCaulley, 1985). For example, if the score indicated a slight preference towards extraversion, more than likely the individual who took the MBTI selected as many introversion items as extraversion items.

The study indicated the most frequent MBTI combination was ISTJ, closely followed by ESTJ. The next largest frequency combination was ESFJ. The three largest combination groups, made up slightly less than half of the entire population, with the common types being sensing and judging. The largest function group was ST at 48.4 percent of the sample. Summarizing the data, it could be noted that a common group was STJ, with little differentiation between the E-I opposite.

There seems to be a common thread between the sample and the type, but should one be surprised? Looking at the types, a sensing person is more practical and factual. Sensing individuals also trust experience. Thinking people are usually analytical, logical problem solvers, and tough-minded. Judging people are more scheduled, organized, and planned. Why do these types show up more in this sample of pre-service educators, than they do with teachers overall? For sensing and judging, there is consistency. But why are agricultural educators more thinking than feeling, as opposed to teachers overall, who are more feeling than thinking? Does an agricultural educator's job require more thinking skills than feeling skills?

Another point of discussion would be the sample itself. The sample included individuals with interests in agricultural education, hence their declaration as agricultural education as a major or minor. Although members of the sample planned on being agricultural educators in one form or another, one thing the sample was not, was 100 percent traditional school teachers. Although several individuals in the sample were going to be agricultural education instructors, not all were planning on a career move in public school education. The variety in career choices could have affected the group data, and should be duly noted by those working with the students in the sample.

This brings about another question. Even though the group was not homogeneous in career choices, why was there such a concentration towards field independence and the types sensing, thinking, and judging (STJ)? What is it about the major and minor that drew that certain type and style together? Perhaps it was still the education component combined with agriculture.

Even though not everyone planned on being in a formal classroom, there is still the educational component – formal and non-formal. The agriculture component to the major and minor could have also affected the sample and its data.

The agriculture component to agricultural education could be explained by several studies which looked at the MBTI of agricultural students and adult farmers (cited in Bargar, Bargar, & Clark, 1990). As cited by Bargar, Bargar, and Clark (1990) a 1989 study by Bargar indicated that the three most frequent types among agriculture students with aspirations to farm were ESTP, ESTJ, and ISTJ. Bargar, Bargar, and Clark also cited from a 1987 study by Homer and Barrett that over half of the adult farmers in the study were either ISTJ or ESTJ. By those studies, it could be suggested that the agriculture component of agricultural education had some influence on why those individuals in the current study majored and minored in agricultural education.

Looking at the correlation results between the GEFT and MBTI, there seems to be no to low associations, which were not expected. Other research results showed correlations greater than those found in this study (Hammer, 1996; Carey, Fleming, & Roberts, 1989). What is so different about this sample that those greater correlation results were not supported? Is there something homogeneous about the sample that refutes the other studies' findings? Or, are those other studies too homogeneous?

Implications

The results of the study indicated certain patterns in agricultural education majors and minors at The Ohio State University from 1990 to 1999. For the most part, the students were field independent. Of the sample, 22.6 percent scored a 17 or greater on the GEFT. The lowest score group was 5.5 percent scoring 15 on the GEFT. The other field independent scores' frequencies were either in the twenties or thirties. If more than half of the sample was field independent, then what implications does this have for those working with these agricultural education majors or minors? Those working with these individuals should be aware of the lack of sociability of the sample, but should utilize the analytical abilities the sample has to offer. For example, those working with the sample should not be concerned with group projects, but instead should focus on independent studies allowing the sample to use their logical, analytical strengths. This is not, however, implying that there should be no group project. Even though the sample may not prefer group projects, group projects should be used to help develop the social skills that may be lacking.

The mean E-I opposite score indicated a tendency towards extraversion. Because the E-I mean score was so close to the central score of 100, one should be aware of the lack of differentiation between the E-I scores of the sample. The MBTI scores do not indicate strength of use between the opposites, but instead indicates certainty of type. In other words, the MBTI was not so certain how extraverted the group was as a whole, but still indicated a slight preference towards extraversion.

The mean S-N opposite score indicated a tendency of the sample to be sensing. The S-N mean score was not as close to the central score, which indicated that the group was more sensing over intuitive than extraverted over introverted. The mean T-F opposite score indicated a tendency for the sample to be thinking. The T-F score was relatively close to the central score. The mean J-P opposite indicated a tendency for the sample to be judging. The J-P score was close to the central score.

Recommendations

Based upon the results and implications of the study, the following recommendations have been formed. Primarily, one should realize the results from the instruments are not meant to pigeonhole or label students. Instead, the results should be treated as indicators of strengths and weaknesses, whether it be in their personality or learning. More specific to this sample, there seems to be certain homogeneous qualities in both learning style and personality type. Those working with or teaching these individuals within the sample, should take note of the group's learning style and personality type strengths and weaknesses.

In working with the individuals of the sample, one should also recognize certain homogenous and heterogeneous traits. Some similarities include the agriculture component of the students, the tendency for the sample to be field independent, and the tendency for the sample to be more sensing, thinking, and judging. In contrast, those working with the sample should recognize the like of homogeneity concerning career choices. Not all of the sample

planned on being agricultural education instructors in a school setting. Therefore, experiences in courses should not be school-centered.

Recommendations for Further Study

One aspect of further study would be to test other homogeneous groups like the sample in the study. Is it the sample of the study or is it a larger population that holds these similar personality type and learning style traits? Do other students majoring and minoring in agricultural education at other land grant universities hold similar qualities as those at The Ohio State University from 1990 to 1999? The information is not conclusive at this point. There are several studies which could be pooled together to make inferences about this supposed homogeneity, but nothing which could be classified as having been replicated by the study (Watson & Hillison, 1991; Whittington & Raven, 1995; Dyer & Osborne, 1996). Where some studies focus on personality types via the MBTI, they did not focus on learning styles via the GEFT, and vice versa.

A closer look at why this sample is homogeneous would also serve as useful information. What aspects, attitudes, or beliefs draw similar people to this sample? Perhaps it is some demographic aspect, such as GPA or home environment. Perhaps these individuals have similar attitudes and beliefs towards work or learning. Whatever the variable, there should be more research to pinpoint the homogeneity.

Perhaps another avenue of research could be the educational component. As discussed previously, the sample was not made up of students who all planned on teaching in the school setting. Perhaps a separation of the sample by current and planned occupation (for those currently employed) would yield different results. Then again, by collecting data from current agricultural education instructors in the state of Ohio with the GEFT and MBTI, and comparing that data with data collected from extension agents in the state of Ohio would likely yield different results.

Furthermore, there is the issue of the agricultural component. The students majoring or minoring in agricultural education, more than likely, have some interest or background in some area of agriculture. If this is true, did these students hold similar backgrounds, which could have influenced their styles and types? If it is conceivable to believe that humans are a product of their environment, then the issue of the agriculture component becomes another possible opportunity of study.

A more in depth study could be taken into the secondary school agricultural education classroom itself. If there are consistent patterns of personality type and learning style within the sample, does this carry over to the classroom instruction? Are these agricultural education instructors teaching the way they learn and process information? If so, what is the implications for those students not of the same personality type and learning style as their teacher? A study could be performed to evaluate the methods to which the teachers are teaching in terms of personality type and learning style. In addition, perhaps the high school students themselves need to be administered the MBTI and GEFT. This could be a carryover

effect to where we are attracting a similar type of high school student. Perhaps the agricultural education profession falls short in terms of diversity in students and teachers.

References

Bargar, J.R., Bargar, R.R., & Clark, R. (1990). Psychological type and the aspirations of farm youth for careers in agriculture. Unpublished paper, The Ohio State University.

Bargar, R. R., & Hoover, R.L. (1982). Psychological type and the matching cognitive style. Theory Into Practice, 23(1), 56-63.

Cano, J. (1999). The Relationship between Learning Style, Academic Major, and Academic Performance of College Students. Journal of Agricultural Education, 40 (1), 30-37.

Cano, J. & Metzger, S. (1995). The relationship between learning style and levels of cognition of instruction of horticulture teachers. Journal of Agricultural Education, 36(2), 36-43.

Carey, J.C., Fleming, S.D., & Roberts, D.Y. (1989). The Myers-Briggs Type Indicator as a measure of aspects of cognitive style. Measurement and Evaluation in Counseling and Development, 22, 94-99.

Davis, J.A. (1971). Elementary survey analysis. Englewood Cliffs: NY: Prentice-Hall.

Dyer, J. & Osborne, E. (1996). Effects of teaching approach on achievement of agricultural education students with varying learning styles. Journal of Agricultural Education, 37(3), 43-51.

Garger, S. & Guild, P. (February, 1984). Learning styles: The crucial differences. Curriculum Review, 9-12.

Hammer, A. (1996). MBTI applications: A decade of research on the Myers-Briggs Type Indicator. Palo Alto, CA: Consulting Psychologists Press.

McCutcheon, L. (1997). An examination of learning style among selected Ohio 4-H adolescents. Unpublished master's thesis, The Ohio State University.

Mischel, W. (1993). Introduction to personality. Fort Worth, TX: Harcourt Brace Jovanovich College Publishers.

Myers, I.B. (1993). Introduction to type. Palo Alto, CA: Consulting Psychologists Press.

Myers, I.B. & McCaulley, M. (1985). Manual: A guide to the development of the Myers-Briggs type Indicator. Palo Alto, CA: Consulting Psychologists Press.

Myers, I.B. & Myers, P. (1995). Gifts differing: Understanding personality type. Palo Alto, CA: Davies-Black Publishing.

Torres, R. M. & Cano, J. (1994). Learning Styles of Students in a College of Agriculture.Journal of Agricultural Education, 35 (4), 61-66.

True Colors Communication Group. (1998). Keys to personal success: Facilitator's handbook. Corona, CA: True Colors/ESI Educational Systems, International.

Watson, L., & Hillison, J. (Winter, 1991). Temperament type and job satisfaction among selected West Virginia agricultural education teachers. Journal of Agricultural Education, 25-30.

Whittington, M.S., & Raven, M. (1995). Learning and teaching styles of student teachers in the northwest. Journal of Agricultural Education, 36(4), 10-17.

Witkin, H.A., & Goodenough, D.R. (1977c). Field dependence and interpersonal behavior. Psychological Bulletin, 84(4), 661-689.

Witkin, H.A. & Goodenough, D. (1981). Cognitive styles: Essence and origins. New York: International Universities Press, Inc.

Witkin, H., Moore, C.A., Goodenough, D.R., & Cox, P.K. (1977a). Field-dependent and field-independent cognitive styles and their educational implications. Review of Educational Research, 47(1), 1-64.

Witkin, H.A., Moore, C.A., Oltman, P.K., Goodenough, D.R., Friedman, F., Owen, D.R., & Raskin, E. (1977b). Role of the field-dependent and field-independent cognitive styles in academic evolution: A longitudinal study. Journal of Educational Psychology, 69(3), 197-211.

Witkin, H.A., Oltman, P.K., Rakin, E., & Karp, S.A. (1971). Group Embedded Figures Test Manual. Consulting Psychologist Press: Palo Alto, CA.

The Relationship Between Learning Style and Personality Type of Students Majoring and Minoring in Agricultural Education at The Ohio State University

A Critique

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The persistence of researchers has resulted in a ten-year data collection process concluding with this study. The length of the data collection makes this study unique. It extends the research of Cano, (1999), Torres and Cano (1994) as well as other studies by these and other researchers.

This study significantly impacts our profession in that it provides conclusions from data collected over time. Learning styles and personality types are important considerations for university teachers. Often little attention is given to these and teaching activities are more dependent upon the preference of the teacher rather then the needs of the students. This large amount of data collected from agricultural education students should be put to use by agricultural educators in their programs.

This study is sound. The theoretical framework is developed and clear objectives are stated. The methods and statistical analysis is appropriate. Validity and reliability are established. In addition, several suggestions for further research is given. The study could be strengthened, however, to provide more useful recommendations. Researchers often suggest that teachers be cognizant of learning styles and personality types without providing evidence of teaching methods and specific activities that will best serve these students.

Several questions arise from this study. These questions relate to both the results of this study and the need for further investigation.

- How do these findings compare to similar studies at The Ohio State University?
- Did time (ten years) influence the variables?
- How do learning styles and personality types of agricultural education students compare to the population in general?
- How should teachers modify teaching activities once they know preferred learning styles and personality types?
- What teaching activities in agriculture should be used to match learning styles?

Much research has been conducted addressing learning styles and personality types. Perhaps it is time to conduct a meta-analysis of these studies or study the relationship between specific agricultural learning activities and learning styles and personality types.

AGRICULTURAL EXTENSION EDUCATORS' PERCEPTIONS REGARDING TEACHING METHODS AND TOOLS FOR EDUCATING FARMERS ABOUT SUSTAINABLE AGRICULTURE PRACTICES

Introduction

External input-based conventional agriculture has contributed to increased food and fiber production throughout the world. However, this increased agricultural production has been achieved at the expense of many social and environmental issues. Conventional agriculture is now widely criticized for its adverse environmental and socio-economic impacts (Bultina, 1991). Many researchers have reported the presence of harmful pesticides and fertilizers in waterways and aquifers (Hallberg, 1986, Nielsen & Lee, 1987). For instance, Kelley et al. (1986) reported that 25 percent of Iowa's population is exposed to detectable levels of agro-chemicals such as nitrate and pesticide residuals through consumption of drinking water. The excessive use of agro-chemicals have accounted for some of the serious health problems such as leukemia, multiple myeloma, and nonhodgkins's lymphoma (Hallberg, 1985). The World Commission on Environment and Development (1987) reported that the incremental grain to fertilizer response ratio dropped from 14.8 in 1934-38 to 11.5 in 1948-52 and 5.8 in 1979-81. This information shows the trend of diminishing agricultural productivity per unit of external input. This increasing dependency on nonrenewable, external resources for farm productivity has become a serious sustainability issue that conventional agriculture faces. Therefore, conventional agriculture is now widely criticized for its adverse environmental, social, and economic impacts (Bultina, 1991). It is becoming increasingly clear that agriculture, as an industry, must move toward sustainability for long-term viability (Marshall & Herring, 1991). There are many definitions for sustainable agriculture. However, Benbrook (1991) explained physical, biological, and socioeconomic components as the main elements of a comprehensive definition of sustainable agriculture. According to his definition (1991, p. 4),

> . . . sustainable agriculture is the production of food and fiber using a system that increases the inherent productive capacity of natural and biological resources in step with demand. At the same time, it must allow farmers to earn adequate profits, provide consumers with wholesome, safe food, and minimize adverse impacts on the environment.

According to this definition, if any agricultural practice increases the production capacity of natural resources while producing foods safely and profitably, it can be considered as a sustainable agriculture practice.

There is an impressive body of scientific knowledge relating to all aspects of sustainable agriculture (Harsch, 1991). However, "an important issue facing sustainable agriculture is the lack of widespread adoption of proven sustainable practices" (Duffy, 1994, p. 9). Duffy (1994) further articulated that despite decades of research and extension efforts, the adoption of many of these practices is remarkably low.

Farmers will not adopt sustainable agriculture practices unless they have knowledge and information about how the new practices will work and the effect these practices will have on their productivity and profitability. Increasing awareness may not lead to adoption, but the farmer's complete comprehension of sustainable agriculture is the first necessary step to adoption (Agunga, 1995). This statement implies the significance of using effective educational programs to help farmers learn about sustainable agriculture practices.

Theoretical Framework

Effective farmer educational programs should be built on adult learning principles using effective teaching methods and teaching tools. Blum (1996, p. 22) described that "age, mental ability, attitude towards learning and acceptance of the method of instruction have been found to influence the transfer of learning." That means transfer of learning with adults can be different from that of children. Knowles (1980) further articulated adult education as a process of facilitating self-directed learning and assuming the role of teacher as a facilitator of self-directed learning. Knowles (1980) further articulated adult education as a distinctive discipline from child education or pedagogy and he termed it as andragogy. Knowles (1980), attributed this difference to the special characteristics of adult learners. According to Knowles (1980) adult learners are more independent and self-directed. They are in different dimensions of life process and rich in experiences. Their readiness to learn aims at developmental tasks of their social roles. Adult learners are more concerned with immediate application of knowledge than gaining knowledge for future application. They are more performance-centered than subject-centered. Adult learners prefer self-directed learning (Irish, 1980). These differences in adults' orientation to learning should be taken into account in helping them to reach their full potential through adult education programs (Knowles, 1980). This statement indicates the importance of selecting appropriate teaching methods and teaching tools in facilitating the adult learning process.

Blum (1996) described that teaching agriculture is somewhat different from teaching many other subjects. Blum (1996) further explained that agriculture is more than a vocational subject. Unlike many other vocational subjects, agriculture is naturally connected with the land, water and rural social life. This "acknowledges a dependency on nature, which it tries to use but which it must also conserve for future generations" (Blum, 1996, p. 7). therefore, agricultural education should not be considered as just the transmission of specific knowledge. It should be considered an improvement of knowledge with responsibility (Blum, 1996). Review of this information indicates the necessity of choosing appropriate teaching methods and teaching tools in educating farmers about sustainable agriculture practices.

Ulmer (1980) suggested that to become an effective adult educator one needs to have a thorough understanding of the way adults learn and the methods of teaching that facilitates learning. Such teaching methods include individual instruction, group discussions and demonstrations. Group discussion is an existing, challenging and dynamic method of teaching. Griffiths mentioned (1999) that group discussion is one of the most rewarding teaching and learning methods for educators and other participants alike. Meierhenry (1983) explained that the selection and use of appropriate teaching tools are crucial to successful

adult learning. This task is made more difficult today by the variety of materials available. When teaching tools are selected, educators should select those that are best fitted to such learner characteristics as age, educational background, social background, learning styles, cognitive styles and gender. The decision to use a particular teaching tool should be made within the total content of the instructional plan. It should not be an "add-on" feature but should be an integral part of the learning experience. Appropriate use of teaching tools provides the impetus and motivation that develops useful and pertinent human interactions and leads to meaningful learning.

What teaching methods and tools are effective in helping farmers to comprehend and use sustainable agriculture practices? This question was the focus of this study. The Extension system has a very important responsibility in educating farmers about sustainable agriculture (Hess, 1991). Therefore, identification of Extension educators' perceptions regarding the use of selected teaching methods and tools is an important area of study. Perceptions are important determinants of human behavior (Pittenger and Gooding, 1971).

Purpose and Objectives

The purpose of this study was to identify agricultural Extension educators' perceptions regarding selected teaching methods and tools for educating farmers about sustainable agriculture. The study aimed to achieve the following specific objectives:

1. To identify the level of effectiveness of selected teaching methods for educating farmers about sustainable agriculture.
2. To identify the level of effectiveness of selected teaching tools for educating farmers about sustainable agriculture.

Methods and Procedures

Research Design

A sample survey research design was used in this study. This was the appropriate design for the study because the objectives of this study were exploratory and descriptive. The required data was obtained by using a self-administrated structured mailed questionnaire. This method is time and cost effective (Tuckman, 1978).

Population and Sample

The target population of this study was comprises of Agricultural Extension Educators in the 12 states of the North Central Region of the United States. Stratified random sampling was used to ensure proportional representation of agricultural extension educators from each state of the twelve states in the North Central region of the United States. Stratified random sampling gives a more representative sample (Ary, Jacobs, & Razavieh, 1996). There were 897 agricultural extension educators in the target population. According to Krejcie & Morgan, (1970) the appropriate sample size for this population is 270 agriculture extension educators. However, in pilot-testing the instrument with a randomly selected sample of 50 extension educators, only 65% of them responded to the questionnaire. Assuming this return rate for the questionnaire, the required mailing sample size was calculated as 415 extension

educators. This sample was randomly drawn proportionate to the total number of agricultural Extension agents in each of the twelve states. The sampling frame was prepared by using information received from Extension sustainable agriculture state coordinators, web-sites and the 2000-2001 County Agents' Director. Multiple sources of information were used to ensure that everyone in the target population had a chance to be in the sampling frame.

Instrumentation

A survey questionnaire was designed to collect data for this study. This instrument was developed by the researchers based on the literature. The instrument focused on Extension educators' perceptions regarding effective teaching methods and tools useful in learning about sustainable agriculture practices. The most commonly used five teaching methods and tools were included in the instrument. Respondents were asked to indicate how effective each of these teaching methods and tools were for educating farmers about sustainable agriculture practices on a five-point Likert-type scale ranging from 1 – (not very effective) to 5 – (very effective). In addition to these teaching methods and tools, respondents were asked to list any other teaching methods and tools that they would consider effective in teaching sustainable agriculture. Finally, there were questions to identify respondents' related demographics in order to describe the population.

"The most obvious type of scientific validity evidence is content-related, which may be gathered by having some competent colleagues who are familiar with the purpose of the survey" (Ary, Jacobs, Razavieh, 1996, p. 462). The content validity of the survey instrument was established by receiving the critical views of the agricultural education faculty and the Extension Sustainable Agriculture State Coordinator of the State University Cooperative Extension Service. Face validity of the survey instrument was established by incorporating the feedback received from the Extension educators during the pilot testing. Reliability of the instrument was verified by obtaining the Cronbach's reliability coefficient from the pilot test data. The Cronbach's reliability coefficient for the instrument was.90, showing that the instrument was reliable for the study.

Data Collection and Analysis

The questionnaire was mailed to the subjects with a cover letter and a return-addressed, stamped envelope. Respondents were asked to return the completed questionnaire within ten days. After ten days, a reminder letter was sent to nonrespondents requesting their response. A third mailing was sent to nonrespondents.

Non-response error was controlled by conducting a telephone interview with randomly selected sample of nonrespondents and comparing these data with the data received from mailed questionnaires. This is an appropriate procedure to address the non-response error (Miller & Smith, 1983). An independent t-test was used to determine if respondents and nonrespondents from the agricultural extension educators differed significantly in their perception regarding the effective teaching methods. No significant differences ($p<.05$) were found between the respondents and nonrespondents in their perceptions regarding the effective teaching methods in educating farmers on sustainable agriculture practices. Agricultural extension educators completed and returned 336 questionnaires for a response rate of 81%. There were 323 (78%) usable questionnaires.

Questionnaire items were coded and entered into the SPSS-Windows computer program for data analysis. Descriptive statistics such as means, standard deviations, and percentages of the variables of interest were obtained.

Results

Characteristics of the Respondents

A majority of the respondents (89.5%) were males. Respondents' mean age was 45 years. The mean years of experience in the cooperative extension service was 15 years. The mean number of sustainable agriculture related inservice training programs they attended during the last five years was three programs.

Perceptions Regarding Teaching Methods

The highest mean value (4.4) was received for one-on-one instruction and demonstrations. Group discussions (3.8) and seminars (3.3) were rated moderately effective. Two Extension educators identified problem solving case studies as a very effective teaching method. One identified hands-on type experiential programs as a very effective teaching method in educating farmers about sustainable agriculture practices. The lowest mean value (2.8) was attributed to lectures. These findings are given in the Table 1.

Table 1. Extension Educators' Perceptions Regarding the Level of Effectiveness of Selected Teaching Methods for Teaching Sustainable Agriculture Practices (n=323)

Teaching Method	Mean	SD	1 %*	2 %*	3 %*	4 %*	5 %*
One-one-one instruction	4.4	.71	0.3	1.2	7.8	38.8	51.9
Demonstrations	4.4	.61	0.0	0.6	4.6	50.8	44.0
Group discussions	3.8	.75	0.6	2.8	30.0	52.3	14.2
Seminars	3.3	.70	0.3	11.5	52.0	34.1	2.2
Lectures	2.8	.78	4.6	28.2	50.8	15.8	0.6

*Percentage of responses on the scale 1=not very effective to 5=very effective

Over 50% of the respondents perceived that one-on-one instructional methods are very effective teaching methods for educating farmers about sustainable agriculture practices.

Perceptions Regarding Teaching Tools

The highest mean value (4.1) was reported for field days. Twenty-eight percent of the respondents said field days were very effective in educating farmers on sustainable agriculture practices. The second highest mean value (3.8) was reported for "study tours" and "workshops". Eighteen percent of the respondents indicated that "study tours" were "very effective" teaching tools for educating farmers on sustainable agriculture. The mean value of the "printed materials" on this Likert scale was 3.4. Computer programs were identified as "somewhat effective" (3.0). "Slides" and "video tapes" received the lowest mean value (2.8). This information is shown in the Table 2.

Table 2. Extension Educators' Perceptions Regarding the Levels of Effectiveness of Selected Teaching Tools (n-323)

Teaching Tool	Mean	SD	1 %*	2 %*	3 %*	4 %*	5 %*
Field days	4.1	.71	0.3	0.9	17.0	54.2	27.6
Study tours	3.8	.78	0.9	2.8	25.0	53.4	17.8
Workshops	3.8	.73	0.9	1.2	31.6	52.3	13.9
Printed materials	3.4	.80	1.2	9.9	41.9	40.4	6.5
Web-sites	3.1	.85	2.2	19.3	49.1	24.5	5.0
Computer programs	3.0	.82	3.7	19.8	52.3	21.4	2.8
Slides	2.8	.86	6.8	24.5	50.8	15.8	2.2
Video tapes	2.8	.90	6.8	27.6	45.8	16.7	3.1

*Percentage of responses on the scale 1=not very effective to 5=very effective

Conclusions and Recommendations

The following conclusions can be drawn from this study:

1. The majority of respondents had extensive experience in Extension.
2. Few inservice programs have been offered on sustainable agriculture.
3. Demonstration and one-on-one instruction were considered most effective methods.
4. Field trips, tours and workshops were considered most effective tools.
5. Results from this study support the findings from the literature on adult education and give support to the idea that Extension systems require an emphasis on educational process skills.

Recommendations

The following recommendations are based on the findings and conclusions of this study:

1. Extension professionals should make sure that they learn more about selected teaching methods and tools if sustainable agriculture topics are to be effectively presented to farmers.
2. A similar study of farmers regarding their perceptions about appropriate learning processes should be conducted.

References

Agunga, R. A. (1995). What Ohio Extension agents say about sustainable agriculture. Journal of Sustainable Agriculture,5(3), 169-187.

Ary, D., Jacobs, L. C., & Razavieh, A. (1996). Introduction to research in education (5th ed.), (p. 462). Texas: Harcourt Brace College Publishers.

Benbrook, C. M. (1991). Introduction. Sustainable agriculture research and education in the field workshop proceedings. Board on Agriculture, National Research Council. Washington, D.C.: National Academy Press.

Bium, A (1996). Teaching and learning in agriculture: A guide for agricultural educators, (pp. 7, 22). Rome: Food and Agriculture Organization of the United Nations.

Bultena, G. L. (1991). A comparison of conventional and sustainable farmers in Iowa. In E. F. Weber (Eds.). Leopold Center for Sustainable Agriculture 1991 conference proceedings: Ames: Iowa State University.

Duffy, M. (1994) Duffy details current sustainable agriculture issues. Leopold Letter,6(4), (p. 9).

Hallberg, G. R. (1986) From hoes to herbicides agriculture and ground water quality. Journal of Soil and Water Conservation,41(6), 357-364.

Harsch, J. H. (1991). Assessing the progress of sustainable agriculture research. Sustainable agriculture research and education in the field: A Proceedings. Board on Agriculture, National Research Council, Washington, D.C.: National Academy Press.

Hess, C. E. (1991). The U.S. Department of Agriculture commitment to sustainable agriculture. Sustainable agriculture research and education in the field workshop proceedings. Board on Agriculture, National Research Council. Washington, D.C.: National Academy Press.

Kelley, R., Hallberg, G., Johnson, L., Libra, R., Thompson, C., Splinter, R., & DeTroy. (1986). Pesticides in ground water in Iowa. In agricultural impacts on ground water. Worthington, Ohio: Natural Well Association.

Knowles, M. S. (1980). The modern practice of adult education: From pedagogy to andragogy. Englewood Cliffs: Cambridge Adult Education.

Krejcie, R. B., & Morghan, D. W. (1970). Determining sample size for research activities. Educational and Psychological Measurement,30, 607-610.

Marshall, T. A., & Herring, D. R. (1991). Sustainable agriculture: An essential part of the in-agriculture curriculum. The Agricultural Education Magazine. 164: 10-12.

Meierhenry, W. C. (1983). Educational materials for teaching adults. New Directions for Continuing Education,(17), p. 5-11. San Francisco: Jossey-Bass Inc.

Nielsen, E. G., & Lee, L. K. (1987). The magnitude and costs of ground water contamination from agricultural chemicals: A national perspective. Agriculture Economic Report 576. Washington D. C.: Economic and Research Service.

Pittenger, O. E., & Gooding, C. T. (1971). Learning Theories in Educational Practice: An Introduction of Psychological Theory and Educational Psychology. New York: John Wiley & Sons, Inc.

Tuckman, B. W. (1978). Conducting Educational Research. New York: Harcourt Brace Javanovich, Inc.

Ulmer, C. (1980). Responsive teaching in adult basic education. In A. B. Knox (Ed.), New Directions for Continuing Education: Teaching adults effectively, Number 6. San Francisco: Jossey-Bass Inc.

World Commission on Environment and Development. (1987). Food 2000: Global policies for sustainable agriculture. London: Zed Books.

Agricultural Extension Educators' Perceptions Regarding Teaching Methods and Tools for Educating Farmers About Sustainable Agriculture Practices

A Critique

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This study combined three areas of interest to the greater agricultural education community: teaching methods and tools, extension education, and the technical content area of sustainable agriculture. The researchers provided a good review of literature related to the study. Much of the literature is more than ten years old, but that may just be evidence that additional inquiry is needed. The instrument was designed by the researchers, with appropriate attempts to ensure content and face validity and reliability. A follow-up of non-respondents was conducted, and the results allowed the researchers to infer the results to the entire population.

The findings are, by design, simple and straightforward. The data are presented in understandable tables and the explanations are clear. There were no "surprises" in the data.

A strength of the paper is the relative completeness of the introduction and theoretical framework. The conclusions section, however, misses the mark in showing how this study builds upon the previous work. Here is where the age of the literature may have affected the richness of the findings and conclusions from the study. Combine these ideas: the literature review is silent on "newer tools" such as web sites and computer programs; the typical respondent was 45 years old and had been in Extension for 15 years; respondents perceived the use of computers and web sites slightly above slides in effectiveness. Do these factors go together in a systematic way?

The final recommendation may be the strongest point of the paper. This study sought to identify the perceptions of the population regarding the effectiveness of teaching methods and tools. How do these perceptions match the needs and interests of the sustainable agriculture clients?

The paper leaves more questions unanswered than answered. Although technically correct in methodology, this seemingly superficial assessment of effectiveness may do more to validate the status quo that to move extension teaching into the current century.

ASSESSING AND PRIORITIZING PRESENT INSERVICE NEEDS AND EVALUATING PAST INSERVICING PROGRAMMING DESIGNED FOR ILLINOIS AGRICULTURAL EDUCATION INSTRUCTORS

Introduction

Inservicing is an important component to every local and state educational infrastructure. Different systems use a variety of methods to provide effective inservicing programming. Agricultural Education is no different than any other educational program. The need for inservicing has been well documented, but the vital key for beneficial inservicing is assessing critical needs to conduct effective programming. Future programming can be developed to meet the current needs, but it is just as important to assess the effectiveness of past programming. Efforts need to be made to prioritize and assess the current inservice needs of agricultural education instructors as well as evaluate prior efforts to determine the overall accountability of such programming.

Several studies have been conducted in the evaluation of inservice needs among beginning or entry-level agricultural teachers (Briers & Edwards, 1998; Garton & Chung, 1997; Garton & Chung, 1996; Talbert, Camp, & Heath-Camp, 1994; Mundt, 1991; Birkenholz & Harbstreit, 1987). The outcomes of these studies were to identify inservice needs and inservice methods to design programming to best fit the desired needs of their constituents. However, these studies are limited to determining the present needs of their constituents for future inservicing programming. These limitations can not account for the effectiveness or ineffectiveness of past programming. How can we plan for the future, if we can not effectively evaluate the past history of inservice programming?

Birkenholz and Harbstreit (1987) concluded that there were five areas of greatest inservice need among beginning teachers in Missouri. They were as follows: using a microcomputer, developing skills in agribusiness management, developing skills in electricity, training teams for contests, and assisting students with SOEP's. Areas of least need of inservice programming were as follows: operating audio-visual equipment, participating in professional activities, conducting field trips, participating in civic organizations, completing local reports, and teaching daily classes. The study found great variation among beginning teachers on a majority of items, because of the vast differences in their responsibilities and situations.

Garton and Chung (1996) found that the ranking of inservice needs, as perceived by beginning teachers and Joint State Staff, did not always correspond. The study found that the top four competencies ranked by beginning teachers were among the top 13 competencies outlined by the Joint State Staff. This is pertinent, because the Joint State Staff designs and conducts inservice programming within the state. The study also found the most preferred methods of inservice instruction. The top two delivery methods preferred by beginning teachers were to hold two to three hour workshops/seminars or sessions during the summer conference.

Garton and Chung (1997) found that completing local reports, motivating students, preparing FFA degree applications, developing public relations, preparing proficiency award applications,

teaching agriscience, utilizing local advisory committee, developing SAE opportunities, using computers in the classroom, supervising SAE programs, teaching using experiments, and conducting local FFA activities were the competencies in greatest need of inservice training. The competencies outlining the least need for inservice training were teaching agricultural construction, teaching the relationship between agriculture and the environment, teaching plant science, conducting parent/teacher conferences, using multimedia equipment, implementing VIMS (state competency recording), teaching animal science, teaching soils, and teaching equine science. Garton and Chung (1997) also used two procedures in identifying inservice needs among beginning teachers. They used the Borich (1980) assessment model as well as a quadrant analysis model. When the procedures were compared, the models were in line with each other giving greater support to their findings.

Briers and Edwards (1998) also conducted a study on assessing the inservice needs of entry level agricultural teachers. This study confirmed the findings of the Garton and Chung (1996) study that the most popular methods of inservice were through workshops at state teachers conference as well as short courses/workshops. Briers and Edwards used an inservice rating and a performance grade to determine inservice needs, instead of an importance and competence ratings used in the Garton and Chung (1996) study. They outlined 163 competencies, instead of the 50 item Borich (1980) model. Briers and Edwards found 71 competencies having a rating of "some need", "much need", or "highest need" among entry level teachers. It also found 92 competencies having a rating of "little need" for inservice programming. Some of the top competencies for inservice needs were using the internet as a teaching tool, integration, distance learning, and adult education. The competencies receiving the lowest ratings were creating a nurturing environment, working with Extension, coping with traumatic changes, managing relationships, and delegating authority.

Overall, past research on inservice needs have made a tremendous impact in assessing the inservice needs of the agricultural education constituents within their states. These studies focused on determining the needs of entry level or beginning teachers. This study focuses on all of the agricultural education instructors within the state of Illinois. The results are to provide a foundation for future inservice programming for the state teachers association and state staff and/or consultants. The professional development committee of the teachers association has the responsibility of designing the inservice programming at the state teachers conference. Members of the state staff conduct other inservice programming deemed necessary within the state.

Purpose/Objectives

The purpose of this study was to assess and prioritize the current inservice needs of Illinois agricultural instructors as well as evaluate the past inservice programming to determine the overall effectiveness of inservicing efforts. It is also important to compare the past history of inservice programs to the current needs, to determine if past efforts were effective and efficient.

Specific objectives were developed to guide the research activities associated with this study. Those objectives were as follows:

1. To prioritize the present inservice needs of secondary Illinois agricultural education teachers.
2. To compare current inservice needs with past inservicing programs to determine the efficiency of past programming efforts.
3. To determine the effectiveness of past inservice programming to aid in future inservice development.

Procedures

The target population was all of the 350 agricultural education instructors in the state of Illinois in the year 2000. It is important to note that a large majority of the agricultural education programs in this state are rural-based, resulting in a large number of one-teacher departments. The study collected 198 usable responses yielding a 57% response rate.

The instrument used in the study was a revised edition of the Garton and Chung (1996) survey. Garton and Chung used a 50-item instrument to determine the inservice needs of beginning teachers. A few minor changes were made to make it suitable to the state being studied. The concept of the instrument was derived from Borich's (1980) assessment model. The items on the instrument were identified from previous research (Shippy, 1981; Hachmeister, 1981; Claycomb & Petty, 1983; Veeman, 1984; Birkenholz & Harbstreit, 1987; Mundt, 1991; Valli, 1992; Talbert, Camp, & Heath-Camp, 1994). Barrick, Ladewig, and Hedges (1983) supported using the Borich model by emphasizing that inservice needs should be based on more than a survey of desired needs and that the Borich model provided defensible data in identifying vital topics that teachers need for further acquisition of knowledge. The Garton and Chung instrument not only assessed the importance of an item, but also retrieved competence data. This comparison between importance and competence achieved the objective of determining the current inservice needs among teachers.

Six additional items were added to the Garton and Chung (1996) instrument. These items included teaching aquaculture, using computer technology, understanding teaching liability issues, learning standards, integration, and understanding state funding applications. Some of the original items were also changed to fit the state instructional system. As a result of these changes, state staff members in Agricultural Education assessed the revised instrument for face validity. Since minimal changes occurred on the revised instrument, the instrument reliability was duplicated from the Garton and Chung (1996) study, which was a .95 (Cronbach's alpha coefficient).

Agricultural instructors were informed to rate each of the 56 items using a five-point Likert scale. The agricultural instructors were asked to evaluate the importance of each item as well as their competence level on each item. A response of five indicated that the item was "very important" and a response of one would indicate "not important" as a current inservice need. The teachers were also asked to rate their competence levels on each of the 56 items using the same rating scale.

The revised instrument was mailed to all 350 agricultural education instructors within the 307 agricultural education programs in the state of Illinois. Included in the mailing was a self-

addressed return envelope. Within a six-week period, 198 completed surveys were returned. Two-week reminders were sent via state list server. The early and late respondents were compared using t-tests with summated means. The comparison resulted in no significant differences at the .05 alpha level. No follow-up was conducted because of the response rate and no significant differences between early and late respondents (Miller & Smith, 1983).

Three different calculations were used to analyze data. The first calculation was the *discrepancy score*, which was figured by taking the importance rating minus the competence rating for each individual on each competency. The second calculation was the *weighted discrepancy score*, which was figured by multiplying the discrepancy score by the mean importance rating. The final calculation was the *mean weighted discrepancy score*. This figure was calculated by taking the sum of the weighted discrepancy scores and dividing them by the number of observations (N=198). The 56 competencies were then ranked, by using the mean weighted discrepancy score. The higher the mean weighted discrepancy score, the greater inservice need for that competency.

Results

The greatest inservice needs among agricultural instructors were divided into several categories. This would indicate that their current needs are not concentrated in one particular area of service. Table 1 prioritizes the present inservice needs among agricultural instructors through the utilization of a Mean Weighted Discrepancy Score (MWDS). The top ten inservice needs according to agricultural instructors are understanding liability issues associated with teaching, motivating students, knowing how to use computer technology, developing public relations, developing SAE opportunities, teaching horticulture, teaching agricultural marketing, managing student behaviors, using computers in the classroom, and teaching problem-solving/decision making skills. All of these competencies had a MWDS range of 4.57 to 2.80, resulting in high importance and lower competence ratings. These competencies can be divided into several categories, such as using technology, classroom management, instructional content, SAE's, and program development. The exciting component to these findings is that the teachers desire more knowledge acquisition in the learning process. Teachers want to know how to motivate their students, how to better manage student behaviors, and how to teach critical problem solving and decision-making skills. It is also critical to point out the need for knowledge in liability issues associated with the teaching profession.

Table 1. Prioritized Inservice Needs Among Illinois Agriculture Education Instructors(N=198)

Rank	Item # Survey	Question Asked	Imp.* level	Comp.* level	MWDS*
1	53.)	Understanding the liability issues w/teaching.	4.11	3.01	4.57
2	46.)	Motivating students to learn.	4.76	3.87	4.24
3	52.)	Knowing computer technology/literacy.	4.40	3.63	3.41
4	20.)	Developing an effective public relations prog.	4.44	3.76	3.05
5	8.)	Developing SAE opportunities for students.	4.27	3.56	3.02
6	10.)	Teaching knowledge & skills in horticulture.	4.06	3.33	2.95

7	24.)	Teaching knowledge & skills in ag marketing.	4.10	3.38	2.94
8	37.)	Managing student behaviors.	4.49	3.84	2.94
9	4.)	Using computers in classroom teaching.	4.32	3.63	2.91
10	16.)	Teach prob-solving & decision-making skills.	4.52	3.90	2.80
11	38.)	Determining content taught in specific course.	4.37	3.77	2.66
12	54.)	Modifying curriculum to IL Learning Stds.	3.77	3.06	2.65
13	9.)	Teaching agribusiness knowledge & skills.	4.38	3.78	2.63
14	32.)	Utilizing a local advisory council/committee.	3.96	3.28	2.62
15	21.)	Teaching record keeping skills.	4.30	3.73	2.52
16	26.)	Teach ag - integrating science & agriculture.	4.38	3.83	2.51
17	17.)	Teaching students with IEP's.	3.93	3.31	2.42
18	55.)	Integrating academics w/other content areas.	3.95	3.33	2.35
19	49.)	Preparing FFA Degree Applications.	3.99	3.41	2.34
20	50.)	Preparing Proficiency Award Applications.	4.00	3.43	2.30
21	41.)	Utilizing a local FFA Alumni affiliate.	3.73	3.11	2.28
22	3.)	Preparing Ag/FFA career development events.	4.25	3.77	2.26
23	15.)	Teaching using experiments.	4.26	3.73	2.22
24	12.)	Organizing and supervising laboratories.	4.32	3.81	2.20
25	39.)	Evaluating the local agriculture program.	4.27	3.73	2.20
26	40.)	Teaching about public issues regarding ag.	4.09	3.57	2.11
27	6.)	Implementing State Goals & Learning Stds.	3.76	3.23	1.95
28	35.)	Assessing & evaluating student performance.	4.35	3.90	1.95
29	25.)	Conducting need assessments and surveys.	3.57	3.04	1.93
30	34.)	Teach the relationship between ag & environ.	4.33	3.89	1.91
31	5.)	Using multimedia equipment in teaching.	4.37	3.94	1.88
32	30.)	Develop perform based assess instruments.	3.56	3.03	1.83
33	51.)	Teaching knowledge and skills in aquaculture.	3.12	2.55	1.83
34	27.)	Locate & select student references & curric.	4.08	3.66	1.75
35	23.)	Conducting local FFA activities and events.	4.48	4.10	1.68
36	43.)	Teaching knowledge and skills in forestry.	3.08	2.58	1.57
37	19.)	Teaching knowledge & skills in plant science.	4.39	4.05	1.51
38	47.)	Developing Tech Prep programs.	3.37	2.94	1.50
39	36.)	Teach knowledge & skills in ag construction.	3.75	3.37	1.41
40	29.)	Teach knowledge & skills in soils & soil mgnt.	4.16	3.83	1.35
41	11.)	Supervising students' SAE programs.	4.13	3.84	1.28
42	7.)	Repair & reconditioning ag mechanics tools.	3.69	3.37	1.23
43	45.)	Develop relations w/colleagues & adm.	4.42	4.15	1.18
44	22.)	Coordinate activities w/local ag agencies.	3.93	3.63	1.17
45	56.)	Completing apps for FCAE incentive funding.	4.41	4.12	1.15
46	44.)	Teaching knowledge and skills in electricity.	3.87	3.59	1.08
47	33.)	Teaching equine science.	3.01	2.68	0.97
48	42.)	Organizing fund-raising activities.	4.08	3.87	0.96
49	31.)	Develop knowledge & skills in animal science.	4.15	3.95	0.90
50	2.)	Completing rpts for local & state adms.	3.82	3.63	0.79
51	14.)	Teaching small gas engines.	3.55	3.40	0.58

52	18.) Conducting parent/teacher conferences.	4.08	4.03	0.27
53	13.) Conduct & teach adult education programs.	2.74	2.71	0.16
54	28.) Organizing a local Young Farmers Program.	2.24	2.21	0.10
55	48.) Planning banquets.	3.78	3.89	-0.39
56	1.) Planning and conducting student field trips.	3.99	4.19	-0.86

**Note: Importance Level: 5 = Very Important, 4 = Important, 3 = Somewhat Important, 2 = Of Little Importance, 1 = Not Important
Competence Level: 5 = Very Competent, 4 = Competent, 3 = Somewhat Competent, 2 = Little Competency, 1 = Not Competent
[a]MWDS: Mean Weighted Discrepancy Score

Furthermore, two of the top three inservice needs were items added to the Garton and Chung (1996) instrument originating from the Borich assessment model. Understanding teaching liability and knowing computer technology (internet, PowerPoint, etc.) were two of the six items added. Four of the six items added were in the top 18 inservice needs. All six additional competencies were outlined in the top 45 inservice competencies. The results of this study affirmed the decision to add these competencies to the revised instrument.

The agricultural instructors were also very clear on the competencies that needed the least inservice attention. These competencies were: teaching equine science, organizing fundraisers, teaching animal science, completing reports for local and state administrators, teaching small gas engines, conducting parent/teacher conferences, conducting adult programs, organizing Young Farmers Program, planning banquets, and planning field trips. All of these competencies had a MWDS rating of 0.97 to -0.86 indicating high importance and competence ratings or low importance and competence ratings. The instructors indicated the low emphasis in adult education and teaching equine science, but affirmed the concept that they were knowledgeable in the areas of conducting the extra-curricular activities associated with agricultural programs.

Table 2 outlines the past inservice programming conducted throughout the state over the last nine years. The competencies are ranked in the same order as in Table 1. The frequency is the number of workshops or conferences conducted in a specific competency, over the past nine years. The percentage is the number of workshops or conferences conducted in a specific competency divided by the total number inservice programming conducted in the state for the past nine years. There were 171 inservice programs conducted throughout the state over the nine years. The inservice programs were then categorized into the 56 competencies based upon their title or purpose. This table outlines the concentration of inservice programming as well as the decision-making ability of state leadership to design the needed inservice programming.

Past inservice programming in the prioritized list outlined in the Table 2 provides great insight. Thirty-six percent (N=61) of past inservice programming was concentrated in the top 20 competencies outlined in Table 1. The other 64% (N=110) of the programs were emphasized in the lower 36 competencies. However, it is important to point out that there were 32 workshops/conferences presented in the horticulture area. Teaching horticulture was number six on the prioritized list of competencies. This indicated that 19% (N=32) of the total inservice programming over the last nine years was focused on teaching horticulture. This would

indicate that either the workshops were not well attended or the teachers did not need that type of inservice programming at that time. The resources indicated that 25 of the 32 workshops presented in the area of horticulture were conducted from 1991-1997. Just recently, more agricultural programs have been building new greenhouses. This is why there is still a need for horticulture inservicing. If horticulture was excluded from the top 20 competencies, 17% (N=29) of the past inservicing programs were concentrated in the other 19 competencies. The findings indicate that there were inservice programs conducted in the top 20 competencies (excluding teaching horticulture), but not at the frequency as in the lower 36 competencies.

Table 2. Frequency of Past Inservice Programming Within Competency Areas (N=198)

Rank*	Item # on Survey	Question Asked	MWDS	Freq.	Percentage
1	53.)	Understanding the liability issues with teaching.	4.57	0	0.00%
2	46.)	Motivating students to learn.	4.24	1	0.58%
3	52.)	Knowing computer technology/literacy.	3.41	9	5.20%
4	20.)	Developing an effective public relations program.	3.05	0	0.00%
5	8.)	Developing SAE opportunities for students.	3.02	0	0.00%
6	10.)	Teaching knowledge and skills in horticulture.	2.95	32	18.50%
7	24.)	Teaching knowledge & skills in agricultural marketing.	2.94	1	0.58%
8	37.)	Managing student behavior problems.	2.94	0	0.00%
9	4.)	Using computers in classroom teaching.	2.91	2	1.16%
10	16.)	Teaching problem-solving & decision-making skills.	2.80	0	0.00%
11	38.)	Determining the content to be taught in courses.	2.66	0	0.00%
12	54.)	Modifying curriculum to Illinois Learning Standards.	2.65	0	0.00%
13	9.)	Teaching agribusiness knowledge and skills.	2.63	1	0.58%
14	32.)	Utilizing a local advisory council/committee.	2.62	0	0.00%
15	21.)	Teaching record keeping skills.	2.52	3	1.73%
16	26.)	Teaching agriscience- integrating science & agriculture.	2.51	7	4.05%
17	17.)	Teaching students with IEP's	2.42	0	0.00%
18	55.)	Integrating academics with other content areas.	2.35	1	0.58%
19	49.)	Preparing FFA Degree Applications.	2.34	3	1.73%
20	50.)	Preparing Proficiency Award Applications.	2.30	1	0.58%
21	41.)	Utilizing a local FFA Alumni affiliate.	2.28	0	0.00%
22	3.)	Preparing Agriculture/FFA career develop. activities.	3.26	21	12.14%
23	15.)	Teaching using experiments.	2.22	8	4.62%
24	12.)	Organizing and supervising laboratories.	2.20	2	1.16%
25	39.)	Evaluating the local agriculture programs.	2.20	0	0.00%
26	40.)	Teaching about public issues regarding agriculture.	2.11	2	1.16%
27	6.)	Implementing State Goals and Learning Standards.	1.95	0	0.00%
28	35.)	Assessing and evaluating student performance.	1.95	0	0.00%
29	25.)	Conducting needs assessments and surveys.	1.93	0	0.00%
30	34.)	Teaching the relationship between agric. & environ.	1.91	5	2.89%
31	5.)	Using multimedia equipment in teaching.	1.88	3	1.73%
32	30.)	Developing performance based assessment instruments.	1.83	1	0.58%

33	51.) Teaching knowledge and skills in aquaculture.	1.83	3	1.73%
34	27.) Locating & selecting student references & curriculum.	1.75	14	8.09%
35	23.) Conducting local FFA activities and events.	1.68	2	1.16%
36	43.) Teaching knowledge and skills in forestry.	1.51	5	2.89%
37	19.) Teaching knowledge and skills in the plant science.	1.51	12	6.94%
38	47.) Developing Tech Prep programs.	1.50	0	0.00%
39	36.) Teaching knowledge & skills in ag construction.	1.41	7	4.05%
40	29.) Teaching knowledge & skills in soils & soil mgnt.	1.35	1	0.58%
41	11.) Supervising students' SAE programs.	1.28	0	0.00%
42	7.) Repairing & reconditioning agricultural mechanics tools.	1.23	0	0.00%
43	45.) Developing relations with colleagues & administrators.	1.18	0	0.00%
44	22.) Coordinating activities with local agricultural agencies.	1.17	0	0.00%
45	56.) Completing applications for FCAE incentive funding.	1.15	0	0.00%
46	44.) Teaching knowledge and skills in electricity.	1.08	4	2.31%
47	33.) Teaching equine science.	0.97	1	0.58%
48	42.) Organizing fund-raising activities.	0.96	0	0.00%
49	31.) Developing knowledge and skills in the animal science.	0.90	9	5.20%
50	2.) Completing reports for local and state administrators.	0.79	0	0.00%
51	14.) Teaching small gasoline engines.	0.58	1	0.58%
52	18.) Conducting parent/teacher conferences.	0.27	0	0.00%
53	13.) Conducing and teaching an adult education program.	0.16	0	0.00%
54	28.) Organizing a local Young Farmers Program.	0.10	0	0.00%
55	48.) Planning Banquets.	-0.39	0	0.00%
56	1.) Planning and conducting student field trips.	-0.86	9	5.20%

**Note: The frequency was the number of inservice workshops conducted in that area over the past 9 years. The percentage was the percentage of the workshops conducted in that area from the total inservice workshops conducted in the 9-year period.

Recent state funding has helped develop many new state focused curriculum projects in Illinois. This funding has also helped with inservice programming for these new projects. As a result of this outcome, the findings indicate high levels of competence in areas of teaching using experiments, teaching agriscience, teaching plant science, teaching animal science, preparing FFA CDE's, and selecting and locating student references. All of these competencies have high importance and competence ratings as well as high frequency of inservicing programming.

Conclusions/Recommendations

The following conclusions are based on the findings of this study.

1. Past state inservice programming for Illinois agricultural education instructors were effectively designed, conducted, and implemented over a nine-year period.
2. A new inservice paradigm must be implemented to ensure that the inservice needs among agricultural education teachers are achieved in the future.
3. More emphasis must be placed on classroom management and professionalism for successful inservicing programming to be achieved.

Agricultural Education in Illinois established a line item in 1989 on the budget of the State Board of Education. There has been a steady increase in funding for Agricultural Education, since the establishment of the line item. The outcomes of this additional funding resulted in tremendous strides in Agricultural Education within Illinois. One of the liabilities associated with additional funding is accountability. The results of this study provide documentation on the effectiveness and efficiency of the line item dollars spent for inservicing Illinois agricultural teachers.

Past inservice programming for Agricultural Education in Illinois has been well designed and implemented. The competencies outlined in this study that received high frequency levels of inservice were items possessing high importance and competence ratings, with the exception of teaching horticulture. The outcomes of this programming resulted in competent teachers in each of these items. These items were also perceived to be areas of high importance for agricultural education teachers to obtain. Items with a frequency of five or more workshops and high importance and competence ratings were teaching plant science, teaching the relationship between agriculture and the environment, teaching using experiments, locating and selecting student references, teaching animal science, teaching agriscience, preparing for CDE's, and planning and conducting field trips. All of these competencies have been the beneficiaries of the additional funding received through the line item. New instructional materials have been designed and distributed in these areas in association with the line item. Inservicing is a key component in the dissemination process with any new curriculum project. However, the results of this study would indicate that less emphasis should be placed on designing future inservice programming in these competencies.

The results of this study found a small percentage of the past inservice programming was concentrated in the top 20 inservice needs among agricultural education teachers. This would indicate that a shift in the paradigm is necessary for future inservicing programming within the state. Thirty-six percent of the past inservice programming was concentrated in the top 20 inservice needs outlined in this study. This percentage would be reduced to 17% if teaching horticulture were excluded. Even without this exclusion, the results still indicate that the inservice paradigm has shifted to a new set of competencies.

The outcomes of the study also indicated the need to shift from instructional content to a more futuristic emphasis on classroom management and professionalism. The respondents desire more knowledge acquisition on how to manage their classroom more efficiently and how to protect their future in the teaching profession. The respondents realized the importance of motivating students and implementing critical thinking, but indicated that they may need more assistance in achieving these competencies. Future inservice programming must respect the respondents needs and desires to make their classroom environment more student friendly.

Inservice programming can be a hit or miss situation. Everyday the learning process changes. The recipients of inservice programming must be ready to accept instruction, in order for behavioral changes to occur. It is recommended that these findings be adopted for future inservicing programming for agricultural education instructors in Illinois. It is also recommended that teacher education programs within Illinois adopt these findings to their

agricultural education pre-service programs. The highest-ranking needs should take precedence in program planning. In addition, future studies should also compare and contrast the present inservice needs with past inservice programming to fully understand the following concept. "Where are we now?" "Where have we been?" "How do we get where we want to go?"

Resources

Barrick, R. K.; Ladewig, H. W.; & Hedges, L. E. (1983). Development of a systemic approach to identifying technical inservice needs of teachers. The Journal of the American Association of Teacher Educators in Agriculture, 24(1), 13-19.

Birkenholz, R. J. & Harbstreit, S. R. (1987). Analysis of the inservice needs of beginning vocational agriculture teachers. The Journal of the American Association of Teacher Educators in Agriculture, 28(1), 41-49.

Borich, G. D. (1980). A needs assessment model for conducting follow-up studies. The Journal of Teacher Education, 31(3), 39-42.

Briers, G. E. & Edwards, M. C. (1998). Assessing the inservice needs of entry-phase agriculture teachers in Texas: A discrepancy model versus direct assessment. Proceedings of the 1998 American Vocational Association Convention. New Orleans, LA.

Claycomb, D. M. & Petty, G. C. (1983). A three year longitudinal study of the perceived needs for assistance as ranked by vocational agriculture instructors. Journal of the American Association of Teacher Educators in Agriculture, 42(4), 28-33.

Garton, B. L. & Chung, N. (1996). The inservice needs of beginning teachers of agriculture as perceived by beginning teachers, teacher educators, and state supervisors. Journal of Agricultural Education, 37(3), 52-58.

Garton, B. L. & Chung, N. (1997). An assessment of the inservice needs of beginning teachers of agriculture using two assessment models. Journal of Agricultural Education, 38(3), 51-58.

Hachmeister, M. H. (1981). Meeting needs of first- and second-year teachers. Proceedings of the 1981 Central States Seminar in Agricultural Education. Chicago, IL.

Miller, L. E. & Smith, K. (1983). Handling nonresponse issues. Journal of Extension, 21, 45-50.

Mundt, J. P. (1991). The induction year - a naturalistic study of beginning secondary teachers of agriculture in Idaho. Journal of Agricultural Education, 32(1), 18-23.

Shippy, R. D. (1981). Professional competencies needed by beginning teachers of agriculture/agribusiness. Journal of the American Association of Teacher Educators in Agriculture, 22(1), 29-34.

Talbert, B. A., Camp, W. G. & Heath-Camp, B. (1994). A year in the lives of three beginning agriculture teachers. Journal of Agricultural Education, 35(2), 31-36.

Valli, L. (1992). Beginning teacher problems: Areas for teacher education improvement. Action in Teacher Education, 35(2), 31-36.

Veeman, S. (1984). Perceived problems of beginning teachers. Review of Educational Research, 54(2), 143-178.

Assessing and Prioritizing Present Inservice Needs and Evaluating Past Inservicing Programming Designed for Illinois Agricultural Education Instructors

A Critique

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The researcher has addressed a continuing and important issue in agricultural education and teacher education, namely, identifying the real inservice needs of high school agriculture instructors. Further, an attempt was made to evaluate past programs in an effort to build upon history and perhaps avoid previous mistakes. The introduction of the paper provides an excellent recap of previous work in assessing need; there is little context presented for the evaluation portion of the research. The paper actually addresses what has been done in the past rather than an evaluation of what has been done.

The researcher utilized an adaptation of an instrument first reported by Borich in 1980, and is commended for building upon previous work. The entire population was included in the study, and the researcher resisted the temptation to apply analysis techniques that are more appropriate for sample data. The only potential flaw in methodology is non-response bias that may not have been adequately addressed. Comparing early and late responses does just that – provides a comparison of those two groups. In this instance, the similarity in responses may not be as important as the demographics. Were respondents representative of the population on such characteristics as geographic location, size of school, course content taught, and experience? These traits may be associated with the perceived importance of and competency in the inservice topics.

The most important information from the study is the prioritized list of potential inservice topics. There is some evidence that incomplete or erroneous information has been used in the past to identify and provide inservice education for agriculture teachers. The listing of priority needs, if representative of the population, should avoid the concerns of the past.

The conclusions and recommendations go beyond the findings of the study. There is no assessment of past effectiveness of programming. If frequency is used as a measure of effectiveness, then a topic that has been offered 32 times in nine years was effective. However, that topic also appears in the top six ranked items based on importance and competence. There are several reasons why this may occur, but the point that past programming has been efficient and effective cannot be supported by the data.

The brief discussion of accountability seems to be misplaced. Nowhere else in the paper is that topic broached. The data reported in the study do nothing to defend or refute the level of accountability in the use of state funds. Perhaps, however, this could be a recommendation from the study. Based on perceived needs and past programs, what should teacher education be doing to provide inservice education, how should those offerings be evaluated, and how should teacher education be held accountable?

JOB SATISFACTION AMONG AGRICULTURAL TEACHER EDUCATORS: NEW DIRECTIONS IN MEASUREMENT

Introduction/Theoretical Framework

Lock (1976) estimated that more than 3,300 studies regarding job satisfaction had been conducted by 1972. Toward this end, Spector (1996) suggested that by 1991, more than 12,400 studies on job satisfaction had been published. Included in the large volume of job satisfaction studies were investigations on the level of job satisfaction among secondary agriculture teachers and agriculture teacher educators throughout the United States.

Castillo and Cano (1999), in a comparative analysis (Newcomb, Betts, & Cano, 1987; Cano & Miller, 1992; Castillo, Conklin, & Cano, 1998), reported that female and male agriculture teachers in Ohio were, overall, satisfied with their jobs throughout the previous ten years. Similarly, Bowen (1980) and Bowen and Radhakrishna (1990), concluded that agricultural teacher educator in the United States were satisfied with their jobs. Overall job satisfaction of agriculture teachers and agricultural teacher educators was derived using a modified version of the Brayfield and Rothe (1951) Job Satisfaction Index. The Job Satisfaction Index was purported to measure overall job satisfaction when all facets of the job were considered. Agricultural education researchers (Bowen, 1980; Bowen & Radhakrishna, 1992; Cano & Miller, 1992; Castillo, Conklin, Cano, 1997) have also sought to determine which particular facets of agriculture teacher's and agricultural teacher educator's jobs contributed to overall job satisfaction.

The theoretical foundation used to investigate levels of job satisfaction with particular facets was the motivator-hygiene theory (Herzberg, Mausner, & Snyderman, 1959). The premise of the motivator-hygiene theory was that jobs had particular factors which contributed to job satisfaction. The factors thought to contribute to job satisfaction (motivators) were: achievement, advancement, recognition, the work itself, and responsibility. Likewise, factors thought to prevent job dissatisfaction, known as hygienes, were: policy and administration, supervision, salary, interpersonal relations, and working conditions. Simply stated, Herzberg et al's., submission was that jobs had factors which promoted job satisfaction (motivators) and factors which, although did not promote job satisfaction (hygienes), were necessary to prevent job dissatisfaction.

The motivator-hygiene theory, although credited with advancing job satisfaction research (Katz & Kahn, 1978; Steers & Porter, 1991), has been criticized. King (1970) suggested that the motivator-hygiene theory attempted to describe five different theoretical interpretations. King (1970) and Locke (1976) added that the motivator-hygiene theory did not adequately take into account individual differences as they pertained to motivation. Katz and Kahn (1978) stressed that subsequent efforts to validate the motivator-hygiene theory, utilizing different measurement techniques, failed to support the theory.

With particular reference to agricultural teacher education, Bowen (1980) discredited the motivator-hygiene theory and concluded that "Herzberg's motivator-hygiene theory is not applicable to teacher educators in agriculture" (p. 107). Bowen (1980) added that "all ten factors were related to job satisfaction and the five hygiene factors explained a higher proportion of the job satisfaction score variance than the five satisfier [motivator] factors." Padilla-Velez (1993), Bowen and Radhakrishna (1990), and Castillo, Conklin, and Cano (1998), also reported relationships between job satisfaction and the hygiene factors, which were purported by Herzberg (1966) to have little affect upon job satisfaction. In addition to theoretical unsoundness, measurement of the motivator-hygiene theory was also questioned.

According to Bowen (1980), Wood (1973) developed the Faculty Satisfaction/Dissatisfaction Scale in order to conduct a study of North Carolina Community College faculty. Wood (1973) developed the Faculty Satisfaction/Dissatisfaction Scale based upon a sample of 224 full-time instructors employed by the North Carolina Community College system. Wood applied factor analysis to the data to investigate the validity of Herzberg, Mausner, and Snyderman's (1959) motivator and hygiene factors. Wood concluded that the instrument was valid and reliable for measuring job satisfaction and dissatisfaction based upon factor analysis data and test-retest and internal consistency measures. However, Wood discredited the motivator-hygiene theory by stating that all ten motivator-hygiene factors were strongly related with overall job satisfaction and dissatisfaction. Moreover, Wood wrote that the hygiene factor, interpersonal relations, was significantly related to job satisfaction, rather than dissatisfaction, as purported by Herzberg, Mausner, and Snyderman (1959). Wood added, contrary to the motivator-hygiene theory, that the ten factors were highly correlated with each other.

Bowen (1980) modified Wood's original "Faculty Satisfaction/Dissatisfaction Scale" by rewording items on the instrument. Additionally, Bowen (1980) added twenty items to the instrument to make the instrument applicable to agricultural teacher educators. Bowen (1980) wrote that "these items were added after consulting The Ohio State University faculty in the Department of Agricultural Education and Ph.D. students who felt that the Wood's (1973) instrument did not adequately address job related factors..." (p. 6). No efforts were made by Bowen to determine if the ten factors could be reduced to a more meaningful and interpretable set of factors. Moreover, no effort was recorded which attempted to reduce the items on the instrument developed by Bowen (1980).

Purpose/Objectives

Based upon Wood's (1973) submission regarding the validity of the motivator-hygiene theory, previous work by Castillo and Cano (1999), and Castillo, Conklin, and Cano (1998), the researchers chose to investigate if the scale items on a modified version (Castillo, Conklin, & Cano, 1998) of Bowen's (1980) instrument could be reduced. Additionally, the researchers sought to investigate the level of job satisfaction among agricultural teacher educators. The following objectives were formulated to guide the study.

1. Were the items on Castillo, Conklin, & Cano's (1998) data set reducible to a meaningful set of factor solutions?

2. What was the level of satisfaction with the new interpreted factor solutions among agricultural teacher educators?

3. What was the overall level of job satisfaction among agricultural teacher educators?

Methods/Procedures

Procedures

Castillo, Conklin, and Cano's (1998) data set of agriculture teachers in Ohio was utilized to determine if the scale items on a modified version of Bowen's (1980) instrument could be reduced using factor analysis. The population for Castillo et al., study consisted of a random sample of male agriculture teachers (N = 453, n = 212). The Krejcie & Morgan formula was used to determine sample size with a 5% margin of error.

The population for the job satisfaction study consisted of a purged list of agricultural teacher educators listed in the AAE Directory of University Faculty in Agricultural Education (1999). A pre-letter to each Department listed in the Directory was sent to each Department informing them that the researcher would be calling the Department Chair to identify the teacher educators in their Department. A census was conducted among the population (N = 183) of identified agricultural teacher educators by Department Chairs.

Instrumentation

Bowen's (1980) version of Wood's (1973) Faculty Satisfaction/Dissatisfaction Scale was modified and used to assess the level of job satisfaction among secondary agricultural education teachers in Ohio (Castillo, Conklin, & Cano 1998). Bowen's instrument provided the basis for describing the teacher's level of satisfaction with the job motivator (achievement, advancement, recognition, responsibility, and working conditions) and the hygiene factors (supervision, salary, interpersonal relations, policy and administration, and working conditions). Next, data reduction statistics were employed on Castillo et al's., data set to develop an instrument which was then used to collect job satisfaction data among agricultural teacher educators in the United States.

To investigate the level of job satisfaction among agricultural teacher educators in the United States, data were collected utilizing a two-part questionnaire. Part I consisted of a 58-item 6-point Likert-type scale which measured respondents' level of satisfaction with the selected job factors: policy and administration, personal growth and satisfaction, and fiscal resources. Respondents were asked to record their responses to the scale which ranged from very dissatisfied (1) to very satisfied (6). Part I was developed by applying data reduction techniques to Castillo, Conklin, and Cano's (1998) data set of Ohio agriculture teachers. Lastly, one item was used to measure respondents' overall level of job satisfaction using the same scale. Part II consisted of demographic information.

Brief (1998) supported the use of a one-item statement to measure overall job satisfaction. Brief added "that summing across facet scores (e.g., adding together a respondent's scores on the JDI (Job Descriptive Index: coworkers, pay promotion opportunities, etc. scales) (Smith, Kendall, & Hulin, 1969) is not equivalent to measuring overall (i.e., general or global) job satisfaction." Citing Scarpello and Campbell (1983), Brief wrote that "their one-item, five-point global rating of overall job satisfaction is reliable and inclusive and that the whole, represented by this global measure, is more complex than the sum of the presently measured parts" (p. 15). Wanous, Reichers, and Hudy (1997) wrote that "There may also be practical limitations favoring the use of a single-item measure" (p. 14). Wanous et al., identified space on an instrument, cost, and face validity as examples of practical limitations which supported the use of single-item measures.

Content validity of the instrument was established by a panel of experts. The panel of experts consisted of agricultural teacher educators at The Ohio State University and graduate students in the Department of Human and Community Resource Development. Each member on the panel of experts was asked to address the following items pertaining to the instrument: item content; item clarity; wording; length; format; and, overall appearance.

A pilot study was conducted among faculty (N = 54) from The Ohio State University Extension Service who had earned a Ph. D. The purpose of the pilot study was to establish a reliability coefficient via the Cronbach's alpha procedure. Reliability coefficients for the identified factors policy and administration, personal growth and satisfaction, and fiscal resources were .96, .89, and .88 respectively. For the overall instrument, a reliability coefficient of .97 was determined.

Data Collection

The data set of the level of satisfaction among Ohio agriculture teachers (Castillo, Conklin, & Cano, 1998) used in the data reduction procedure were collected following Dillman's (1978) recommended procedures. Three separate mailings yielded an 80% response rate. There were no significant differences between early and late respondents with regard to the 10 sub-scales which constituted the level of satisfaction with the motivator and hygiene factors.

Job satisfaction data among agricultural teacher educators were collected via a mailed questionnaire following Dillman's (1978) recommendations. A response rate of 86% was obtained for the study. Two instruments were returned incomplete, thereby resulting in an 84% usable response rate. To control for non-response error, late respondents were compared to early respondents on the variables: age, years in current position, and total years in higher education, satisfaction with the selected job factors: policy and administration, personal growth and satisfaction, and fiscal resources. There were no significant differences. Poling (1990) conducted a study of job satisfaction faculty at The Ohio State University utilizing a census and controlled for non-response error by comparing early to late respondents. Furthermore, Miller and Smith (1983) advocate the use of comparing early to late respondents in order to control for non-response error.

Analysis of Data

Common factor analysis was used to determine if the items on the Castillo, Conklin, and Cano (1988) data set were reducible. The suitability of the data set for exploratory factor analysis was examined. Correlations among the items, the correlation matrix, the Kaiser-Meyer-Olkin (KMO) statistic, and the measure of sampling adequacy were examined. SPSS was utilized to analyze the data reduction procedure and the investigation of job satisfaction among agricultural teacher educators.

Correlations among items ranged from negligible to substantial (Davis, 1971). More than half of the correlations were above .30. Next, Bartlett's Test of Sphericity was used to determine if the item correlation matrix was an "identity". The hypothesis "Ho: Population correlation matrix is an identity" was rejected. Furthermore, observation of the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy revealed that the KMO statistic was near 1. The measure of sampling adequacy for each of the items were greater than .60, which indicated further that the data set was suitable for common factor analysis investigation.

Common factors were extracted using the maximum likelihood method. Three factors were extracted based upon observation of the scree plot. The factors were rotated to obtain the simplest factor solutions. Similar to the principal components analysis which was conducted on Castillo, Conklin, and Cano's (1998) data set, the three factors were rotated both orthogonally using varimax rotation, and obliquely using direct oblimin. Upon observation of the factor solutions, the researcher chose to interpret the orthogonal rotation, which was more meaningful and interpretable.

Results/Findings

Stevens (1992) recommended using loadings which were .40 or greater for identifying variables which load on a particular factor. The variable loadings for each factor are presented in Table 1.

Table 1. Rotated Factor loadings of the Level of Satisfaction with the Motivator-Hygiene Factors Among Agriculture Teachers in Ohio. (Castillo, Conklin, & Cano, 1998)

Factor	Factor Loadings
Factor #1	
Counsel and guidance given by my administrator.	.923
The competence of my administrator to give leadership.	.898
Personal encouragement given by my administrator.	.864
The initiation of innovations by my administrator.	.862
The sensitivity of my administrator to my needs.	.862
Duties delegated by my administrator.	.858
Authority delegated by my administrator.	.844
The fairness of my administrator.	.842
The willingness of my administrator to delegate authority.	.826

Factor	Factor Loadings
Factor #1	
The consistency of my administrator.	.775
The understanding me and my admin have of each other.	.684
The recognition I get from my administrator.	.681
The extent to which administrative procedures are understood by teachers.	.664
The extent to which administrative policies are understood by teachers.	.638
Committee responsibilities.	.621
On-the-job supervision given by my administrator.	.589
The extent to which administrative procedures are actually followed.	.589
The extent to which administrative policies are actually followed.	.563
The extent to which policies meet teachers' needs.	.558
The extent to which I am informed about matters affecting me.	.528
Procedures used to select teachers for promotions.	.481
Publicity given to my work and ideas.	.474
My recognition compared to the recognition of co-workers.	.442
The adoption of practices which I recommend.	.424
The range of salaries paid to teachers in our school.	.405
Factor #2	
My actual achievement of work related goals.	.680
Observing student's growth and success.	.625
The total amount of responsibility I have.	.624
Personal goal attainment.	.618
Teacher student relationships.	.615
The authority I have to get the job done.	.615
Students following the practices being taught.	.590
The interesting aspects of teaching.	.581
The number of classes for which I am responsible.	.572
The challenging aspects of teaching.	.567
Professional relationships on the job.	.556
My involvement in making decisions.	.546
Personal relationships on the job.	.539
The extent to which I am able to objectively evaluate My accomplishments.	.533
Overall school relations among teachers, students, And staff	.504
My immediate results of my work.	.494
Responsibilities outside my major areas of interest.	.471

Factor	Factor Loadings
Factor #2	
Opportunities to attend professional conferences workshops.	.459
The number of class preparations per week.	.453
The educational philosophy which prevails in our school.	.449
Opportunities for increased responsibility in education.	.447
Opportunities provided for growth in education compared with other fields.	.437
Factor #3	
Monies for supplies.	.939
Monies for teaching aids.	.907
Monies for equipment.	.877
The adequacy of instructional equipment.	.747
My laboratory facilities.	.640
My classroom facilities.	.541
The top salary available to teachers compared to similar positions in other fields.	.446
Monies for travel to professional conferences, workshops, etc.	.444
Specific on-the-job training offered by my school.	.429
The amount of my salary.	.390
The adequacy of my fringe benefits.	.376
The method used to determine my salary.	.359
My salary compared to that of people with similar training in other fields.	.356
The adequacy of my raises.	.325

Based upon factor loadings, the researcher chose to retain the factor names of policy and administration (Factor #1), personal growth and satisfaction (Factor #2), and fiscal resources (Factor #3), which were previously identified by Castillo and Cano (1999). The total amount of common variance extracted by the factor policy and administration was 73.46%, for the factor personal growth and satisfaction 14.87% of the common variance was extracted. Lastly, the total amount of common variance extracted by the factor fiscal resources was 11.70%.

Table 2 describes the level of satisfaction with the selected job factors policy and administration, personal growth and satisfaction, and fiscal resources and the overall level of satisfaction among agricultural teacher educators. The level of satisfaction with the selected job factors policy and administration (N = 149), personal growth and satisfaction (N = 153), and fiscal resources (N = 151) among agricultural teacher educators was 4.40, 4.98, and 4.02 respectively. The overall level of job satisfaction among agricultural teacher educators (N = 158) was 4.99.

Table 2. Means and Standard Deviations for Satisfaction with Policy and Administration, Personal Growth and Satisfaction, and Fiscal Resources and Overall Job Satisfaction.

Variable	Mean	SD.
Policy and Administration	4.40	.92
Personal Growth and Satisfaction	4.98	.58
Fiscal Resources	4.02	1.00
Overall Job Satisfaction	4.99	.79

Conclusions/Recommendations/Implications

The items on the modified version of Bowen's (1980) instrument were reducible, via factor analysis, to a more meaningful and interpretable set of items. This conclusion implies that similar constructs are being measured in a more parsimonious manner while retaining instrument stability and contributing to face validity. Tinsley and Tinsley (1987, p. 414) suggested "that the goal of factor analysis is to achieve parsimony by using the smallest number of explanatory concepts to explain the maximum amount of common variance in a correlation matrix." The reduced items, referred to as the 3-Factor Job Satisfaction Scale, should be used in further research efforts which attempt to investigate the factors which facilitate job satisfaction among agricultural teacher educators. Moreover, future research efforts whereby a random sample of female and male faculty members is utilized should be conducted to further investigate the nature of the 3-Factor Job Satisfaction Scale.

Agricultural teacher educators, overall, were slightly satisfied with the factor policy and administration. The motivation-hygiene factors which comprise the selected job factor policy and administration in the current study were: supervision, policies, recognition, relationships, advancement, and responsibility.

Bowen (1980) and Bowen and Radhakrishna (1990), concluded that agricultural teacher educators were slightly satisfied with the factors supervision, policy and administration and advancement. Bowen (1980) concluded that agricultural teacher educators were moderately satisfied with the recognition aspects of their job. However, ten years later, Bowen and Radhakrishna (1990) concluded that agricultural teacher educators were slightly satisfied with the recognition aspects of their job. With regard to the relationship factor, Bowen (1980), and Bowen and Radhakrishna (1990), concluded that agricultural teacher educators were moderately satisfied with the relationship aspect of their job. Lastly, Bowen (1980) and Radhakrishna (1990) concluded that agricultural teacher educators were moderately satisfied with the responsibility aspects of their job.

For the current study, the selected job factor, policy and administration was defined as the courses of action adopted for the management of agricultural teacher educators. The current level of satisfaction with the policy and administration factor of agricultural teacher educators' jobs implies that the policy and administrative aspects of their jobs are slightly deficient in meeting the needs of agricultural teacher educators. Therefore, the major implication with

regard to the level of satisfaction with the factor policy and administration is that in order to keep the agricultural teacher educators satisfied with the factor policy and administration, administrators should review occasionally the policy and administration aspects of the agricultural teacher educators' jobs.

Agricultural teacher educators, overall, were moderately satisfied with the factor personal growth and satisfaction. The motivation-hygiene factors which comprise the selected job factor personal growth and satisfaction were the work itself and achievement. Bowen (1980), and Bowen and Radhakrishna (1990), concluded that agricultural teacher educator were moderately satisfied with the work itself and achievement aspects of their job.

Based upon the nature which the selected job factor personal growth and satisfaction has upon agricultural teacher educators' level of job satisfaction, administrators of agricultural teacher educators should seek new and innovative methods by which to enrich the jobs of agricultural teacher educators. Ultimately, an agricultural teacher education job enrichment model should be developed and adopted.

The current level of satisfaction with the factor personal growth and satisfaction suggests that agricultural teacher educators value the personal growth and satisfaction aspects of the job. The implication, therefore, is that there is a need to enrich the jobs of agricultural teacher educators.

Agricultural teacher educators, overall, were slightly satisfied with the factor fiscal resources. The 3-Factor Job Satisfaction Scale was not used in previous studies to determine agricultural teacher educators' level of satisfaction with the factor fiscal resources. The motivation-hygiene factors which comprise the selected job factor fiscal resources in the current study were salary and working conditions. Bowen (1980), and Bowen and Radhakrishna (1990), concluded that agricultural teacher educators were slightly satisfied with the salary and working conditions aspects of their job.

The slightly satisfied level of satisfaction with the factor fiscal resources implies that current fiscal resource allocations are not adequate. Specifically, the level of satisfaction with the factor fiscal resources implies that efforts should focus on the level of finances which are transformed to supply and support agricultural teacher educators in conducting their job.

To increase the level of satisfaction with policy and administration, personal growth and satisfaction, and fiscal resources, agricultural teacher educator administrators, as part of a committee, should consider collaborating with an executive education center to develop a customized leadership education in-service workshop. The leadership education in-service should take place once a year.

Agricultural teacher educators in the United States were moderately satisfied with their job. Bowen (1980), and Bowen and Radhakrishna (1990), revealed that agricultural teacher educators were satisfied with their jobs. It is clear that over the past twenty years, agricultural teacher educators have remained satisfied with their jobs.

Roznowski and Hulin (1992) suggested that "once an individual joins an organization, a vector of scores on a well-constructed, validated set of job satisfaction scales becomes the most informative data an organizational psychologist or manager can have." Additionally, Judge, Hanisch, and Drankoski (1995) suggested that job satisfaction measures indicated the quality of human resource systems in an organization. An implication of these submissions, with regard to the level of overall job satisfaction among agricultural teacher educators, informs administrators that quality human resource systems are in place by which agricultural teacher educators are governed.

Because of the relevance which job satisfaction has upon an organization, the level of satisfaction among agricultural teacher educators should continue to be investigated every ten years. Moreover, to deduce the implications which the level of satisfaction among agricultural teacher educators may have upon public school agricultural education teachers and students enrolled in agricultural teacher education programs, the level of satisfaction among public school agricultural teachers and students enrolled in agricultural teacher education programs should also be investigated.

References

Bowen, B.E., & Radhakrishna, R.B. (1990). Job satisfaction of agricultural education faculty: A constant phenomena, Journal of Agricultural Education, 32((2), 16-22.

Bowen, B.E. (1980). Job satisfaction of teacher educators in agriculture. Unpublished doctoral dissertation, The Ohio State University, Columbus.

Brayfield, A.H., & Rothe, H.F. (1951). An index of job satisfaction. Journal of Applied Psychology, 35, 307-311.

Brief, A.P. (1998). Attitudes in and around organizations. Thousand Oaks, CA: Sage Publications, Inc.

Cano, J., & Miller, G. (1992). A gender analysis of job satisfaction, job satisfier, and job dissatisfier factors of agricultural education teachers. Journal of Agricultural Education, 33(3), 40-46.

Castillo, J.X., & Cano, J. 1999). The principal components of the motivator-hygiene theory of Ohio agricultural education teachers. National Agricultural Education Research Conference. Conference Proceedings. (December 1999).

Castillo, J.X., & Cano, J. (1999). Factors explaining job satisfaction among faculty in the College of Food, Agricultural, and Environmental Sciences Faculty at The Ohio State University. Unpublished manuscript, The Ohio State University, Columbus.

Castillo, J.X., Conklin, E.A., & Cano, J. (1998). Job satisfaction of Ohio Agricultural education teachers. Journal of Agricultural Education, 40(2), 19-27.

Davis, J.A. (1971). Elementary Survey Analysis. Englewood Cliffs, NJ: Prentice Hall.

`Dillman, D.A. (1978). Mail and telephone surveys: The total design method. New York: John Wiley & Sons.

Dyer, J.E. (Ed.). (1999, September). AAAE Directory of University Faculty in Agricultural Education. (Available from the U.S. Department of Education, Washington, D.C.).

Herzberg, F. (1966). Work and the nature of man. New York: The World Publishing Company.

Herzberg, F., Mausner, B., & Snyderman, B.B. (1959). The motivation to work. New York: John Wiley & Sons.

Judge, T.A., Hanisch, K.A., & Drankoski, R.D. (1995). Human resource management and employee attitudes. In G.R. Ferris, S.D. Rosen, & D.T. Barnum (Eds.). Handbook of human resource management (pp. 574-596). Massachusetts: Blackwell Publishers, Ltd.

Katz, D., & Kahn, R.L. (1978). The social psychology of organizations. New York: John Wiley & Sons.

King, N. (1970). Clarification and evaluation of the two-factor theory of job satisfaction. Psychological Bulletin, 74(1), 18-31.

Miller, L., & Smith, K. (1983). Handling nonresponse issues. Journal of Extension, 21(5), 45-50.

Newcomb, L.H., Betts, S.I., Cano, J. (1987). Extent of burnout among teachers of vocational agriculture in Ohio. The Journal of the American Association of Teacher Educators in Agriculture, 28(1), 26-34.

Padilla-Velez, D. (1993). Job satisfaction of vocational teachers in Puerto Rico. Unpublished doctoral dissertation, The Ohio State University, Columbus.

Poling, R.L. (1990). Factors associated with job satisfaction of faculty members at a land-grant university. Unpublished doctoral dissertation, The Ohio State University, Columbus.

Roznowski, M., & Hulin, C. (1992). The scientific merit of valid measures of general constructs with special reference to job satisfaction and job withdrawal. In C. J. Cranny, P. C. Smith, & E. F. Stone (Eds.), Job Satisfaction: How people feel about their jobs and how it affects their performance (pp. 123-163). New York: Lexington Books.

Smith, P.C., Kendall, L.M., & Hulin, C.L. (1969). The measurement of satisfaction in work and retirement. Chicago: Rand McNally & Company.

Spector, P. (1996). Industrial and organizational psychology: Research and practice. New York: John Wiley.

Steers, R.M. & Porter, L.W. (Eds.) (1991). Motivation and work behavior. (5th ed., pp. 410-417). New York: McGraw-Hill, Inc.

Stevens, J. (19920. Applied multivariate statistics for the social sciences (2nd ed). (pp. 373-407), Hillsdale, NJ: Lawrence Erlbaum.

Tinsley, H.E., & Tinsley, D.J. (1987). Uses of factor analysis in counseling psychology research. Journal of Counseling Psychology, 34(4), 414-427.

Wanous, J.P., Reichers, A.E., & Hudy, M.J. (1997). Overall Job Satisfaction: How good are single item measures? Max M. Fisher College of Business, Working Paper Series, 96-20, No. 13-25. The Ohio State University.

Wood, O.R. (1973). An analysis of faculty motivation to work in the North Carolina community college system. Unpublished doctoral dissertation. North Carolina State University, Raleigh.

Job Satisfaction Among Agricultural Teacher Educators:
New Directions in Measurement

A Critique

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This study builds upon a substantial line of inquiry both outside and within agricultural education. The literature review is thorough in laying the groundwork for this new look at an existing data set and utilizing the results with a different population. In effect, the instrument used to collect data from teacher educators was developed from an analysis of the data from agriculture teachers in 1998. The paper is a bit confusing in places, since the procedures used in the 1998 study are presented as if the data were collected at a later time (no indication of that date appears in the paper).

The factor analysis of the original data set is presented in table form. The explanation is clear and appears to follow acceptable procedures for the technique. The description of the table indicates that variables with factor loadings of .40 or greater would be included, yet the table includes all variables. Is factor three defined only by the variables above .40 or all of the variables? A perusal of the variables in factor #3 shows that the variables below .40 are all salary-related as opposed to "fiscal resources."

The explanation of the three factor names created confusion. Apparently the factor analysis had been performed at some other point or with a similar set of data (referenced to the 1999 study). This information needs to be clearer; was a purpose of this study to verify the factor analysis of a previous study?

Beyond these questions, the study does present some very useful information. First, it can be concluded that obtaining data regarding job satisfaction can be done relatively easily, with just four questions. Will the profession be comfortable with that? Will administrators, faculty in other disciplines, or other groups "believe" data about job satisfaction when data are presented from only four questions?

The conclusions, recommendations and implications section of the paper is thoughtful. Arguments are made on the basis of the findings and previous literature. There may be a tendency to over-state concerns based on the satisfaction scores, since there are no comparative data for similar populations using the three-factor model.

Nevertheless, the paper does address the target audience of readers in an appropriate way. Recommendations for action within agricultural teacher education are posited and should be noted by the profession. How can teacher education carry out these recommendations?

AN ASSESSMENT OF DESKTOP VIDEOCONFERENCING'S POTENTIAL TO ENHANCE COMMUNICATION AND STUDENT TEACHER SUPERVISION IN AGRICULTURAL EDUCATION

Introduction

Many authorities in the field of education feel strongly that student teaching is the most important part of any teacher education program (Richardson-Koehler, 1988; Zaborik, 1988). The student teaching experience is a time when the preservice teacher can actually perform the day-to-day tasks that are the responsibility of a teacher. This hands-on real-world experience is supported by Dewey's (1938) proposition that learning is not automatically transferable to conditions unlike those in which the learning took place.

A successful student teaching experience requires the student teacher, cooperating teacher, and university supervisor to work as a team (Hoover, O'shea & Carroll, 1988). Developing and maintaining communications among the parties is of great importance. The physical distance that separates the student teacher and the university supervisor may result in pedagogical difficulties, especially in the area of communication. Moore and Kearsley (1996) called this pedagogical distance that is created by physical separation "transactional distance." Moore and Kearsley noted that we overcome this transactional distance with instructional design and interaction procedures.

Desktop videoconferencing might be a useful tool to reduce the transactional distance between student teachers and their university supervisors. Relatedly, computer conferencing appears to have the potential to improve the level of student teachers' reflective thinking about their teaching performance and to assist in developing new methods of teaching (Harrington, 1992).

Research on various components of videoconferencing has become more advanced as interest in distance education continues to rise (Mason, 1995; Rapaport, 1991). Research on desktop videoconferencing has been conducted to assess its feasibility and to evaluate the quality and effectiveness of communication. Edmonds (1996) found that desktop videoconferencing could be successfully used to improve the quality of interaction between students and teachers and could improve the quality of learning. Veen et al. (1996) observed that students felt free to speak about feelings, attitudes, and social problems that they were facing during their student teaching experience while engaged in videoconferences. Warren et al. (1996) noted that videoconferencing offered opportunities for individual student teachers to share their experiences with others and to receive responses and communicate more frequently with their university supervisor.

Previous research involving desktop videoconferencing has been conducted on relatively small populations. More data are needed to adequately evaluate the usefulness of desktop videoconferencing technology (Dudt & Garrett, 1998; Veen et al., 1996). Can desktop videoconferencing be a useful tool for enhancing communication and instructional supervision of student teachers in agricultural education?

Purpose and Objectives

The primary purpose of this study was to test an alternative method for facilitating communication between student teachers and university supervisors. The objectives of this study were to:

1. Describe demographic characteristics of the student teachers, cooperating teachers, and university supervisors involved in this study.
2. Describe attitudes of student teachers, cooperating teachers, and university supervisors toward the use of desktop videoconferencing as a tool to enhance communication and instructional supervision.

The hypotheses of this study were as follows:

1. Student teachers, cooperating teachers, and university supervisors will be more positive about using desktop videoconferencing to enhance communication and instructional supervision after experiencing a combination of on-site supervision and supervision facilitated by desktop videoconferencing.
2. There will be no difference in grades for student teaching between the group receiving on-site supervision only and the group experiencing a combination of on-site supervision and supervision facilitated by desktop videoconferencing.
3. Student teachers who received a combination of on-site supervision and supervision facilitated by desktop videoconferencing will achieve a higher level of reflective thinking than those who received only on-site supervision.

Procedures

The population consisted of 17 student teachers, 17 cooperating teachers, and 5 university supervisors. An additional university supervisor conducted two on-site supervisory visits. The sixth supervisor became involved after disagreements arose between the student teacher and the original supervisor. The sixth university supervisor was not added to the population of this study. The treatment group was purposefully selected based on the availability of sufficient computer equipment in the student teaching centers. The treatment group (n=9) received two on-site university supervisor visits and two desktop videoconferencing visits with their supervisor. Participants in the treatment group videotaped two lessons and sent them to their university supervisor. The tapes were reviewed by the university supervisor and discussed during the desktop videoconferences. The control group (n=8) received the traditional three on-site university supervisor visits and experienced no videoconferencing.

A Likert-type scale was used to measure participants' attitudes toward desktop videoconferencing and was given as a pre- and posttest. Another Likert-type instrument was used to measure the level of reflective thinking achieved by the student teacher and was administered only as a posttest. The instrument designed for attitudinal assessment was patterned after one used to study attitudes toward an interactive communications network (Miller, 1997). The instrument to evaluate the student teacher's level of reflective thinking was created by Germain Taggart and obtained from the book Promoting Reflective Thinking in Teachers: 44 Action Strategies (Taggart & Wilson, 1998).

According to Taggart and Wilson (1998) reflective thinking on the technical (lower) level occurs mainly from referencing past personal experiences to meet outcomes. Reflection focuses

on behaviors, content, and skill when designing lessons. Reflective thinking on the contextual (mid) level looks at alternative practices for problem solving based on knowledge gained. Contextual reflective thinkers are concerned with student needs and with the analysis, clarification, and validation of principles when designing lessons. Reflective thinking on the dialectical (highest) level addresses not only student needs but also student moral, ethical, or socio-political issues. The dialectical reflector works toward attaining disciplined inquiry, individual autonomy, and self-understanding in the designing of lessons.

A panel of seven graduate students and three faculty members in Agricultural Education determined that the attitude instrument possessed content and face validity. The panel members were not otherwise involved in the study. The attitude instrument was then pilot tested with 11 students enrolled in a junior-level Foundations of Agricultural Education course, seven graduate students, and three faculty members in Agricultural Education. Cronbach's alpha was used to assess the internal consistency of the attitude instrument. The resulting coefficient was .84.

Construct validity for the reflective thinking instrument was based upon the instrument's correspondence to a reflective thinking model that was created to explain three levels of reflective thinking. A reliability analysis was performed on the reflective thinking instrument using data provided by the student teachers that were studied. The Cronbach's alpha coefficient was .78.

All data were analyzed with the SPSS for windows personal computer program. Frequencies, percentages, means, standard deviations, and appropriate correlational statistics were used for descriptions. The rules of thumb established by Ary, Jacobs and Razavieh (1996) were used to interpret relationships between variables. The chi-square and t-test statistics were used to test the hypotheses.

Students participated in a focus group interview at the end of their student teaching semester. Kruger (1994p. 3) states that "the focus group allows for group interaction and greater insight into why certain opinions are held." The purpose of the focus group was to create a triangulation of data to see if the qualitative data were consistent with the quantitative data. The treatment group was asked questions regarding the benefits and problems of desktop videoconferencing technology used during their student teaching experience. The control group was asked questions about communication between themselves and their university supervisor. Two students were unable to participate in the focus group interviews because they were out of state performing student teaching activities during the time that the questions were administered.

Results

Objective One: Describe demographic characteristics of the student teachers, cooperating teachers and university supervisors involved in this study.

Of the nine student teachers in the treatment group, five (55.6%) were male, and four (44.4%) were female. Members of the treatment group were on average 22.7 years of age with a standard deviation of 1.4. Their mean GPA was 3.33 with a standard deviation of .38. Regarding the control group, five (62.5%) were male, and three (37.5%) were female. Members of the control group were on average 24.5 years old with a standard deviation of 5.4. Their mean GPA was 3.27 with a standard deviation of .41. There were no statistically significant associations between student teacher group and the demographic characteristics reported here.

All of the cooperating teachers in the treatment group were male. This group averaged 17.4 years of teaching experience with a standard deviation of 7.9. Only 22.2% of teachers in this group had participated in a workshop on supervising student teachers. Seven out of eight cooperating teachers in the control group were male. Teachers in this group had on average taught for 14 years with a standard deviation of 5.9. Three (37.5%) of the teachers in the control group had participated in a workshop on supervising student teachers. There were no statistically significant associations between cooperating teacher group and the demographic characteristics reported here.

All five university supervisors were male. The university supervisors ranged in age from 32 to 63 years with a mean of 42 and a standard deviation of 13. The average number of years of experience teaching secondary agriculture education was 5.2 with a standard deviation of 2.1. The average number of years teaching postsecondary agricultural education was 11.8 with a standard deviation of 13.

Objective Two: Describe attitudes of student teachers, cooperating teachers, and university supervisors toward the use of desktop videoconferencing as a tool to enhance communication and instructional supervision.

At the time of the pretest, the majority (66.6%) of student teachers in the treatment group either disagreed or were undecided that the use of desktop videoconferencing could enhance communication and instructional supervision. The remaining 33.3% agreed that desktop videoconferencing could be used as a tool to enhance communication and instructional supervision. Half (50%) of the students in the control group either disagreed or were undecided about the use of desktop videoconferencing to enhance communication and instructional supervision. The remaining 50% agreed with the use of the tool to enhance communication and instructional supervision. The average score for the treatment group was 3.03 with a standard deviation of .80. The average score of the control group was 3.46 with a standard deviation of .65 (Table 1).

At the time of the posttest, the majority (75%) of the student teachers in the treatment group either disagreed or were undecided about the use of desktop videoconferencing to enhance communication and instructional supervision. In contrast, less than half (42.9%) of the students in the control group either disagreed or were undecided about the use of desktop videoconferencing to enhance communication and instructional supervision. The average score for the treatment group was 2.97 with a standard deviation of .70. The average score of the control group was 3.12 with a standard deviation of .94 (Table 1).

A coding error on the pretest made it impossible to distinguish the treatment and control groups for the cooperating teachers. Pretest scores from cooperating teachers showed that the majority (88.6%) were in favor of desktop videoconferencing being used as a tool to enhance communication and instructional supervision. The remaining 13.4% of teachers either disagreed or were undecided about the use of the tool to enhance communication and instructional supervision. The average pretest score was 3.83 with a standard deviation of .68. Regarding the posttest, most (85.7%) of the cooperating teachers in the treatment group agreed or strongly agreed that desktop videoconferencing could be used to enhance communication and instructional supervision whereas 75% of those in the control group expressed the same level of

agreement. The mean score for the treatment group was 3.95 with a standard deviation of .59. The mean score for the control group was 3.56 with a standard deviation of 1.11 (Table 1).

Table 1. Attitudes toward the use of desktop videoconferencing as a tool to enhance communication and instructional supervision.

	Student Teachers								Cooperating Teachers											
	Pretest				Posttest					Posttest					University Supervisors					
	Treatment		Control		Treatment		Control		Pretest		Treatment		Control		Pretest		Posttest			
Attitude	f	%	F	%	f	%	f	%	f	%	f	%	f	%	f	%	f	%		
Strongly Disagree	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	12.5	0	0.0	0	0.0		
Disagree	2	22.2	1	12.5	2	25.0	2	28.6	1	6.7	0	0.0	0	0.0	0	0.0	0	0.0		
Undecided	4	44.4	3	37.5	4	50.0	1	14.3	1	6.7	1	14.3	1	12.5	1	20.0	1	20.0		
Agree	3	33.3	4	50.0	2	25	4	57.1	11	75.3	5	71.4	6	75	4	80.0	4	80.0		
Strongly Agree	0	0.0	0	0.0	0	0.0	0	0.0	2	13.3	1	14.3	0	0.0	0	0.0	0	0.0		
Mean [a]	3.03		3.46		2.97		3.12		3.83		3.95		3.56		3.80		3.69			
Standard Deviation	.80		.65		.70		.94		.68		.59		1.11		.25		.49			

[a] 1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, 5 = strongly agree

Four out of the five university supervisors participated in desktop videoconferencing. Because of the small sample size, university supervisors were not divided between treatment and control groups. Pretest scores for university supervisors showed that 20% (n=1) of the university supervisors were undecided about the use of desktop videoconferencing as a tool to enhance communication and instructional supervision. The remaining 80% (n=4) agreed that desktop videoconferencing could be a useful tool to enhance communication and instructional supervision. Posttest scores placed university supervisors' level of agreement into the same categories as the pretest scores. University supervisors reported slightly lower mean attitude scores on the posttest.

Focus Group Interview Results

Treatment

Seven out of the nine students in the treatment group successfully installed the Quickcam cameras and Microsoft NetMeeting. Three of the cameras had to be installed outside of the agricultural education classroom. One camera was installed in the school library, one in a connecting classroom designated for computer aided drafting, and one was installed at the student teacher's home. Students found many difficulties with the installation of NetMeeting because of the lack of training and the fact that many schools locked classroom computers from various chat and electronic mail programs. Many of the schools' computer technicians had to unlock the block on the computers before the installations could be accepted.

Seven out of the eight participants in the focus group were satisfied with two on-site university supervisory visits. Student teachers did note that they would feel more comfortable with three on-site visits instead of two on-site visits and two videoconferencing visits. Students gave the following comments:

> "I would like to say that I got more out of personal visits than I did trying to do a videoconference."
>
> "Personal visits were better than videoconferencing, either mine didn't work or the one here on campus didn't work."
>
> "The technological difficulties and the time it took to play with the cameras and trying to get them to work really created more problems than it was worth."

Students in the treatment group were asked if desktop videoconferencing should be used in the future for other student teachers. Student teachers in the treatment group gave the following comments:

> "Yes, it should be used but all of the bugs need to be worked out."
>
> "I feel that the technology has a long way to come before it can be beneficial to us."
>
> "If you can get the technology to work and the compatibility problems fixed, then it would be a useful tool."

"If you make it accessible with more schools and computers and if you have some patience it works out."

"Yes I do believe that is would be beneficial, without doing it we are never going to advance."

Students were asked about the strengths and weaknesses of videoconferencing. Many of the students noted that they wanted to be asked instead of told to participate in the videoconferencing. Additionally, some felt that university supervisors were trying to escape an on-site supervisory visit. Other weaknesses concerned the technology problems. Many of the schools had slow and overloaded servers. Concerning the strengths of videoconferencing the following comments were made:

"It had its strengths of allowing us to communicate back and forth. We could share ideas and experiences that others might have had while student teaching."

"It keeps you connected...learning to use that type of technology is good."

"I think it should be integrated and obviously this is a starting point."

Student teachers were asked if they had conferences with other student teachers during the twelve-week period. Five of the eight participants in the interview said that they participated in conferences with each other during the twelve-week student teaching experience. Student teachers were asked if they had any additional comments about desktop videoconferencing. More responses concerning the technological difficulties and the equipment problems emerged. One student said that he had great success with the videoconferencing.

"Videoconferencing was good enough to replace a visit with my university supervisor, two visits were plenty for me. I think the strengths outweigh the weaknesses. My university supervisor and I did some sharing of files and did some things on the Internet together, so I enjoyed it personally."

Other students did not feel this type of impact with desktop videoconferencing, but the majority agreed that it should be used with future student teachers if the technological difficulties could be worked out. Students also pointed out that better training with the equipment is needed as well as more planning before student teachers go to their student teaching centers.

Control

The first question for the control group related to whether or not they thought that the student teachers in the treatment group had better communications with fellow student teachers and university supervisors. Three out of the six participants felt that the treatment group had somewhat of an advantage. The remaining three participants did not see any advantage. The following comments arose.

"Yeah, I think that they probably did...I think that it would have been a highly useful tool to talk with the other students...I think that they had an advantage to get things communicated."

"In some aspects...they would have a chance to send their messages faster or right on the spot and not have to think about it and dwell on it."

"I don't think that there were any big advantages having it...to me it seems like it takes a lot more time trying to get on to the system...so I don't think there was an advantage."

Students were asked next if they would have liked to have used desktop videoconferencing during their student teaching experience. All six of the participants said no. Students reflected on timing conflicts, and all stated that they did not have the time while student teaching for desktop videoconferencing. Student teachers also mentioned the need for better training on the equipment. All student teachers in the control group heard about the problems and frustrations that students in the treatment group experienced.

University supervisor interviews

Interviews after the student teaching period with university supervisors showed that four out of five of the supervisors felt that two desktop videoconferences could successfully replace one on-site supervisory visit. Most (n=4) university supervisors did point out that at least two on-site supervisory visits were needed during the student teaching experience. One visit during the first period of student teaching and the second near the end of the student teaching experience were considered to be a necessity. University supervisors felt that all visits should not occur through desktop videoconferencing.

University supervisors described conversations through videoconferencing visits as being very similar to conversations that took place during on-site visits. Topics that were discussed over desktop videoconferencing included reflection on the lesson that was viewed by the university supervisors from a videotape sent by the student teachers, current agricultural education job opportunities, state teacher licensing procedures, FFA activities, and various student teaching assignments. University supervisors did note that they missed interaction between the student teacher and his or her students by only watching the videotape rather than being at the site in person.

Videotape quality varied with each student teacher in the treatment group. Some cooperating teachers operated the camera, resulting in a good-quality video. Other videos were made from a stationary position in the classroom. As a result the entire classroom and some classroom interaction was not recorded. Sound quality was often low because the microphone was too far away from the person speaking.

Hypothesis One: Student teachers, cooperating teachers, and university supervisors will be more positive about using desktop videoconferencing to enhance communication and instructional supervision after experiencing a combination of on-site supervision and supervision facilitated by desktop videoconferencing.

Student teachers and university supervisors were less positive about using desktop videoconferencing to enhance communication and instructional supervision after experiencing a combination of on-site supervision and supervision facilitated by desktop videoconferencing. Cooperating teachers who experienced desktop videoconferencing were slightly more positive than those who did not (Table 1). The difference was not great enough, however, to be statistically significant (t= -.83, 13df, p>.05).

Hypothesis one was not supported by the data.

Hypothesis Two: There will be no difference in grades for student teaching between the group receiving on-site supervision only and the group experiencing a combination of on-site supervision and supervision facilitated by desktop videoconferencing.

Table 2 shows the grades achieved by the student teachers. Most student teachers (94.1%, n=16) earned an A. One (5.9%) student teacher earned an A-. A chi-square analysis was used to determine if treatment and control groups' grades differed significantly. The results show no significant difference in grades between the treatment and control groups. Hypothesis two was supported by the data.

Table 2. Student teaching grades.

	Treatment		Control	
Grade	f	%	f	%
A-	0	0.0	1	12.5
A	9	100.0	7	87.5

Note. phi = .265, p > .05

Hypothesis Three: Student teachers who received a combination of on-site supervision and supervision facilitated by desktop videoconferencing will achieve a higher level of reflective thinking than those who only received on-site supervision.

Table 3 compares the reflective thinking levels achieved by student teachers in the treatment and control groups. Reflective thinking levels were interpreted as follows: <75 = Technical level; 75 to 104 = Contextual level; 105 to 120 = Dialectical level. Students who received desktop videoconferencing as a tool for supervision (n=8) reported a mean of 104.3 with a SD of 9.25. Students who did not receive desktop videoconferencing (n=7) reported a mean of 105.7 with a SD of 4.31. Although treatment and control group scores were in different categories, the difference between their reflective thinking levels was not of statistical or practical significance. Hypothesis three was not supported by the data.

Table 3. Student teachers' reflective thinking levels

	Technical		Contextual		Dialectical			
Group	f	%	f	%	f	%	M	SD
Treatment	0	0.0	4	50.0	4	50.0	104.3	9.25
Control	0	0.0	3	42.8	4	57.2	105.7	4.31

Note: $t = .383$, $p > .05$

Conclusions and Recommendations

Conclusions

- Desktop videoconferencing is an acceptable tool for communication and instructional supervision.
- A lack of adequate technology resources in secondary agricultural education programs is a serious barrier to using desktop videoconferencing with all student teachers.
- Overall, students teachers were undecided about the use of desktop videoconferencing as a tool to enhance communication and instructional supervision.
- Professors and cooperating teachers, including cooperating teachers who were not in the treatment group, held positive attitudes toward desktop videoconferencing as a tool to enhance communication and instructional supervision.
- Levels of reflective thinking and grades achieved were neither positively nor negatively affected by the desktop videoconferencing treatment.

Recommendations

- Findings of this study should be shared with university supervisors of agricultural instruction to serve as a benchmark of potential pros and cons of desktop videoconferencing as a tool to enhance communication and instructional supervision during the student teaching experience.
- More investigation is needed to evaluate computer equipment, server capabilities, and connection speed at secondary sites so videoconferencing hardware and software can be installed properly.
- More reliable technology tools should be sought to enhance communication and instructional supervision. High-speed interactive audio and video networks that use phone lines or fiber optic networks may provide a reliable option.
- This study should be replicated to analyze the capabilities of desktop videoconferencing in other states and to evaluate attitudes towards the technology from other student teaching populations in other teaching majors.

References

Ary, D. Jacobs, L., & Razavieh, A. (1996). Introduction to research in education. 5th ed. Ft. Worth, TX: Harcourt Brace College Publishers.

Dewey, J. (1938). Experience and education. New York: Collier Books.

Dudt, K., & Garrett, K. (1998, March). Using video conferencing to supervise student teachers. Paper presented at the SITE 98: Society for information technology & teacher education international conference, Washington, D.C.

Edmonds, R. (1996). Distance teaching with vision. Paper presented at the Australian society for educational technology, Melbourne, Australia.

Harrington, H. (1992). Fostering critical reflection through technology: Preparing prospective teachers for a changing society. Journal of Information Technology for Teacher Education, 6(1), 67-82.

Hoover, N. L., O'shea, L. J., & Carroll, R. G. (1988). The supervisor-intern relationship and effective interpersonal communication skills. Journal of Teacher Education, 39(2), 22-27.

Kruger, R. (1994). Focus Groups: A practical guide for applied research. 2nd ed. Thousand Oaks, CA: Sage.

Mason, R. (1995). Using communications media in open and flexible learning. London: Institute of Educational Technology, Open University.

Miller, G. (1997). Agricultural Education at a Distance: Attitudes and perceptions of secondary teachers. Journal of Agricultural Education, 38(1), 54-60.

Moore, M. & Kearsley, G. (1996). Distance education: A systems view. New York, NY: Wadsworth Publishing Company.

Rapaport, M. (1991). Computer mediated communications. New York: Wiley.

Richardson-Koehler, V. (1988). Barriers to effective supervision of student teaching: A field study. Journal of teacher education, 39(2), 28-35.

Taggart, G., & Wilson, A. (1998). Promoting reflective thinking in teachers: 44 action strategies. Thousand Oaks, CA: Corwin Press Inc.

Veen, Wim, & Others. (1996, September). Partnership and cooperation at two levels: Tele-guidance in teacher education. Paper presented at the Annual conference of the association for teacher education Europe, Scotland, United Kingdom.

Warren, Ron., & Others. (1996). Building communication environments in distance education. Paper presented at the Annual meeting of the speech communication association, 82nd, San Diego, CA.

Zaborik, J. A. (1988). The observing-conferencing role of university supervisors. Journal of Teacher Education, 39(2), 9-16.

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An Assessment of Desktop Videoconferencing's Potential
to Enhance Communication and Student Teacher Supervision
in Agricultural Education

A Critique

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A clearly stated purpose and set of objectives led the research activity of this study. The hypotheses, drawn from the literature reviewed, set the stage for a study on the effects of video-conferencing on the supervision of a student teaching field experience. The researchers are complemented for their ambitious design implementing a traditional quantitative approach, as well as qualitative complement. The quantitative instruments used were validated properly and attained acceptable levels of internal reliability. The explanation of reflective thinking was interesting, and provides an annotation for scholars within the profession on the subject and it's associated areas. However, it seems that if an individual's reflective thinking ability is to be assessed regarding the affect of an intervening variable it would be necessary to compare the individual's growth in reflective thinking by a pre, post and longitudinal test analysis.

In the results of the study, a very straight forward approach was followed in addressing the objectives and hypotheses. Information was clearly presented in correct tabular format which was easy to read and interpret. In the case of objective one and the report on significance regarding age, is the phenomenon of life experience and it's psychological impact adequately considered without some comparison of the data based on age? In this case, two years difference with a standard deviation of 5.4 could provide considerable difference. Also, in regards to the purpose of the study, the data reported on participation in a supervising teacher workshop could be the most revealing and useful information of the study. The report of data from focus group interviews could be strengthened through a clearer definition of questioning protocol. For instance were all interviews conducted by the same researcher, specifically what were the questions asked, and was there an emergence of central themes from the interviews which supported quantitative results? The qualitative information was reported primarily as raw data without inferences from the triangulation goal.

Given the information age in which time period this study is conducted, the research addressed an interesting topic. However, the issue of this study may well be an interpersonal one intertwined in non-verbal communication, personal investment, perceptual reality, etc. Another avenue of research aimed at cost effective supervision, may involve inservice of cooperating teachers, benefit comparison of university/ cooperating teacher supervision, and the strategic timing of university supervision during the student teaching field experience.

CHARACTERISTICS OF LEARNERS EXPLAINING THE BENEFIT OF STUDENT INTERACTION IN A DISTANCE- AND TECHNOLOGY-SITUATED ENVIRONMENT

Introduction

Distance learning has become a common feature in many postsecondary education institutions and will become more common in the future (U.S. Department of Education, 1999). American higher education has struggled with how to ensure that students learning at a distance receive the same quality education, if not better, as the traditional on-campus students (Broad, 1999). As technology increasingly becomes part of the instructional delivery, instructors need feedback. Instructors need a means of getting feedback from the learners to assess how these variables are helping or hindering learning (Bourne, McMaster, Rieger, & Campbell, 1997; Broad, 1999; The Institute for Higher Education Policy, 2000) because variables of technology and distance influence the learning environment for distance learners (Clark & Salomon, 1986; Gutierrez, 2000; Hara & Kling, 2000; Kupritz, 2000).

Distance learning, in the most general sense, is learning that occurs through synchronous or asynchronous communications at a different site than the instructor (Phipps, Wellman, & Merisotis, 1998). Although distance learning does not have to include educational technology, commonly, distance learning relies heavily on technologies of delivery (McIsaac & Gunawardena, In press). Therefore, for the purpose of this study, distance learning, also known as distance education, refers to a learning environment where educational technology is used to deliver and facilitate instruction to remote locations via interactive video and computerized technologies, including both synchronous and asynchronous learning.

Key elements to distance learning are: (a) The instructor's interaction with the technology, and (b) the instructor's ability to utilize these technologies to interact with students (Pilcher & Miller, 2000). Educational technology is only as effective as the people are determined to learn and teach with it effectively (Birkenholz & Stewart, 1991). Technology should be an instructional tool to make the content comprehensible and not be the focal point of learning (Murphy, 1999). Agricultural educators have posited that constructivist approaches to learning are more advantageous in distance- and technology-situated environments because they focus on active student interaction (Miller & Pilcher, 2000; Miller & Shih, 1999b; Murphy, 1999; Pilcher & Miller, 2000). Moreover, instructional designs that encourage student interaction and student-centered responsibility should be investigated in distance learning environments (Pilcher & Miller, 2000). Off-campus learners had more positive attitudes when they perceived the instructor as a facilitator of learning rather than an information provider (Miller & Honeyman, 1994). Therefore, interaction among the students is tenably one of the most significant factors to distance- and technology-situated environments in agricultural education.

Numerous research studies have been conducted related to distance learning in other educational settings, however, a couple comprehensive reviews (Russell, 1999; The Institute for Higher Education Policy, 1999) of research on distance learning are noteworthy. Russell's (1999) annotated bibliography, *The No Significant Difference Phenomenon*, of over 200 studies indicated the attitudes and satisfaction of distance learners were generally positive, and the

educational outcomes of distance learners were similar to the educational outcomes of traditional on-campus students. Moreover, The Institute for Higher Education Policy (1999) reported that "most of these studies conclude that, regardless of the technology used, distance learning courses compare favorably with classroom-based instruction and enjoy high student satisfaction" (p. 3). In addition, Clark (1994) expostulated that the methods of instruction contributed to the differences in learning results, not the attributes of the media.

It could be suggested that if distance learning provided no significant advantage in learning achievement, why should capital be invested in technologies that support education and distance learning? Bork noted that America's educational delivery systems must change to reach large numbers of students in the future (Educause, 1999). Furthermore, Bork advocated that the computer was the best hope for individualizing learning. In addition, Bork admitted that most current uses of computers in learning were inadequate because the learning situations were often driven by technology issues rather than learning issues. Bork emphasized that "the key to developing effective computer-based learning is not the integration of particular computer tactics...but the use of skilled teachers..." (p. 5).

Although technology is an integral part of distance learning, any successful program must focus on the instructional needs of the learners, rather than on the technology itself (Sherry, 1996). Therefore, the focus of distance learning research needs to be on the teaching-learning process, that is, the teachers and the learners. Further, Kelly (1990) indicated that distance learning required educators to develop new skills in instructional strategies, methods of teaching, teacher-student interaction, feedback, and evaluation. The challenge for distance learning instructors involved adapting fundamental communication skills that enabled them to communicate, relate to, and interact with students with which they never had face-to-face contact (Smith, Tyler, & Benscote, 2000). Moreover, Smith, Tyler, and Benscote (2000) recommended that instructors be flexible and willing to make necessary changes to ensure the delivery of instruction.

Learners need to assess their own learning and how it is influenced, both positively and negatively. The process of reflection can enable learners to take charge of the learning process. Wegerif (1998) recommended that distance learning instructors facilitate opportunities for learners to reflect on what was learned and how it was learned. McCaslin and Good (1996) "hypothesized that realistic self-evaluation functions as a powerful motivational tool available to the learner because it fosters the integration of realistic goal setting (motivation), protection of intentions (volition), and analysis of level of attainment (or nonattainment) and its consequences" (p. 636).

While many research studies have been conducted related to distance learning, new situations using new technology require continual study and evaluation (Picciano, 1998). Andriole (1997) advocated that the way to improve the design and development of distance learning courses was to engage in systematic empirical evaluation of student judgments about the courses as to how well the courses actually generated the desired learning outcomes. As technology becomes integrated with the educational environment, evaluation needs to be an integral part of the establishment of a learning program (Graham, Scarborough, & Goodwin, 1999).

In an effort to identify a potentially useful theoretical framework to classify learning strategies and tactics useful for distance learning, Miller and Pilcher, (2000) recommended that further studies be conducted to measure active learning and instructional designs which encouraged student interaction and student-centered learning. Moreover, Pilcher and Miller (2000) recommended that the theoretical framework proposed by McKeachie, Pintrich, Lin, and Smith (1986) be investigated to explain the relationship between learning strategies and students' achievement in a distance learning environment. Pilcher and Miller suggested that metacognitive strategies and resource management strategies provided adult learners with the most promising tools to enhance their success in distance learning courses, whereas, cognitive strategies appeared to be less significant because adults learners had mastered these types of study tactics. Therefore, the theoretical framework in agricultural education plausibly supports that interaction variables are most critical to the success of learning in distance- and technology-situated environments.

Purpose and Objectives

A new pre-agricultural education major was offered to students at an agricultural technical college (ATC) located 100 miles northeast of the main university campus. The ATC students needed the introductory agricultural education course within the 2-year program. Therefore, the "Introduction to Agricultural Education" course was offered as a distance learning course to on-campus students at the main university campus and to off-campus students at the agricultural technical college during the Spring, 2000 quarter. This was a multi-media course, which utilized synchronous communication—two-way interactive video, and asynchronous communication—WebCT, to deliver the instruction and facilitate the learning. The course was designed from a constructivist approach that focused on the students actively engaged in the learning process while the instructor facilitated.

There was a need to monitor and assess the students' learning to get feedback because this was the first time that the course was taught using technology in a distance learning environment. The instructor was concerned with how the distance and technology would influence the learning process. Furthermore, research inquiry and evaluation was needed to make decisions regarding distance learning courses in the future. Miller (1998) stated that little research has been done to determine what factors might be useful in predicting achievement in distance courses delivered by educational technologies. Therefore, the focus of this study was on the characteristics of the learners and how certain variables influenced the interactive component of learning in a distance-situated and technology-enhanced environment. Instructors and administrators who plan or do teach in a distance-situated and/or technology-situated environment need knowledge of learner characteristics that are most influential on learning, which would affect their achievement.

The purpose of the study was to explore the following question: To what extent can the variability in the sum of variables related to interaction among students and instructors be explained by a number of selected variables that describe the characteristics of students in an introductory agricultural education course? The independent variables investigated in the research were: cognitive strategies, intrinsic value, self-efficacy, and self-regulated learning

strategies, perceptions of distance-learning instruction, and perceptions of web-enhanced instruction. The dependent variable of this study was interaction benefit.

Procedures

The target population for this correlational-exploratory multiple regression study was undergraduate students enrolled in the "Introduction to Agricultural Education" course at a large Midwestern university during the Spring, 2000 quarter. There were 43 students in the accessible, convenient population. The students, mostly sophomore and junior rank, were enrolled in the course as a requirement for their major or minor, or as an elective course. Thirty-five students were enrolled at the main campus site and 8 students were enrolled at the off-campus, ATC site.

Several methods and procedures were used to collect the data. Two questionnaires were administered to the students in the course—an open-ended questionnaire at mid-quarter and a closed-ended questionnaire at the end-of-the-quarter. A modified Delphi technique was used to collect data for the dependent variables of this study. For the purpose of this study, some modifications of the Delphi technique were related to the selection of participants—students enrolled in the introductory agricultural education course rather than a panel of experts, and, having two rounds or iterations due to the short time frame of the course, which resulted in the purpose of general agreement rather than reaching consensus. The first round was an open-ended questionnaire administered at the mid-point of the quarter (5th week). The second round was a closed-ended questionnaire administered at the end of the quarter (10th week).

For Round 1, the researcher created the instrument used to collect the data of this study. The questionnaire contained four open-ended questions: (1) What has *helped* you as a learner in this course? (2) What has *hindered* you as a learner in this course? (3) What *adjustments* do you recommend be made to improve the teaching-learning process in this course? (4) Do you have any *other comments* you would like to share with the instructor? The questionnaire for Round 1 was posted for the students on WebCT. Students submitted the questionnaire through WebCT or electronic mail. A follow-up e-mail was sent as a reminder to all of the students. A content analysis was conducted after Round 1. The data from Round 1 was sorted twice: (a) Variables related to the interactive video classroom or variables related to the web-enhanced instruction, and (b) variables that helped or hindered the students' learning.

The questionnaire for Round 2 was administered during the last class session. The instructor left the room, a volunteer collected the questionnaires, and they were not reviewed or analyzed until grades were submitted to control extraneous variables related to the instructor's influence. Students responded to a self-reported questionnaire that consisted of three parts during the last class session. Part 1 consisted of 21 variables related to interactive video classroom and 21 variables related to web-enhanced instruction identified by the learners as either helping or hindering their learning in the course through the mid-quarter feedback collected from Round 1 (Knobloch, 2000). Students' knowledge was measured using the Certainty Method of Response (Warren, Klonglan, & Sabri, 1969). Students were asked to make 2 responses to each item using the following two-part rating scale. First, the students were to identify if the variable was a hindrance or help: ☹ (hindered) or ☺ (helped). Second, the students were asked to indicate their level of agreement (certainty) if the variable helped or

hindered their learning using the following scale: 1 (Slightly), 2 (Somewhat), 3 (Moderately), 4 (Mostly), or 5 (Absolutely). The response categories were coded into an 11-point scale, then recoded to a 16-point scale of "certainty scores" in parentheses: ☹5 = 1 (0), ☹4 = 2 (3), ☹3 = 3 (5), ☹2 = 4 (6), ☹1 = 5 (7), ☹ or ☺ = 6 (8), ☺1 = 7 (9), ☺2 = 8 (10), ☺3 = 9 (11), ☺4 = 10 (13), ☺5 = 11 (16). A neutral response was recorded by the respondent circling a ☹ or ☺, but leaving the scale of agreement blank. Items with no responses were left blank. Post hoc reliability, using Cronbach's alpha, for Part 1 was .82 for the 14 variables (Table 1) related to interaction benefit. Part 2 consisted of 12 items adapted from Miller's (1995) study related to attitudes of videotaped instruction, which was used to collect data on the learners' perceptions of distance learning and web-enhanced instruction. The summated rating scale had six response options: (1) Strongly disagree, (2) moderately disagree, (3) slightly disagree, (4) slightly agree, (5) moderately agree, and (6) strongly agree. Post-hoc reliability of the perception domains were .73 for distance learning and .80 for web-enhanced instruction. Part 3 of the questionnaire consisted of 42 items from the Motivated Learning Strategies Questionnaire—MSLQ (Pintrich, Smith, Garcia, & McKeachie, 1991), which represented four domains of learning strategies--cognitive strategies (13 items), intrinsic value (9 items), self-efficacy (9 items), and self-regulated strategies (10 items). Students were asked to respond to the items on a 7-point summated rating scale ranging from "not at all true of me" to "very true of me." Post-hoc reliability alphas of the four domains were: .73 for cognitive strategies, .80 for intrinsic value, .89 for self-efficacy, and .62 for self-regulated strategies. Face and content validity for the closed-ended questionnaire was established by a panel of five faculty members who are experts in agricultural education at a large Midwestern university. Given the nature of the Delphi technique, additional types of validity were not appropriate for the instrument. However, prior to this study, Pintrich et al. (1991) established construct validity of the MSLQ using factor analysis, and Miller (1995) established content validity of the perception items.

Analysis of Data

Descriptive statistics were used to analyze the data sample of Round 2. The data set was analyzed using SPSS. Means and standard deviations were calculated for each of the items in Part 1. Items were listed in rank order. The interpretation range was set *a priori*. Items with mean scores higher than 8.5 were considered helpful to learning. Items with mean scores between 7.5 and 8.5 were considered to neither help nor hinder learning. Items with mean scores lower than 7.5 were considered to hinder learning. Variables related to student interaction were summed. Negatively worded items in Part 2 and 3 were reverse coded. Means and standard deviations were calculated for the domains in Parts 1, 2, and 3. Furthermore, descriptive-correlational were also used to analyze the data sample. Pearson product-moment coefficients were reported for the relationships between the dependent variable and each of the independent variables. Simultaneous multiple linear regression was used to analyze the most significant relationships. The alpha level was established *a priori* at .05.

Results

Forty-two students completed the formative (Round 1) and summative (Round 2) questionnaires for 98 percent response rates. Fourteen variables related to interaction helped the students learn in the introductory agricultural education course (Table 1). The mean of the

interaction benefit was 11.01 (*SD*=1.86), indicating that students perceived that these 14 variables moderately helped their learning in a distance- and technology-situated environment (Table 2). Furthermore, the cognitive strategies (*M*=4.62, *SD*=.73), intrinsic value (*M*=4.96, *SD*=.92), and self-efficacy (*M*=4.92, *SD*=.88) items were "mostly true" of the students. The self-regulated strategies (*M*=4.07, *SD*=.57) were "quite true" of the students. The students were slightly positive in their perceptions related to distance learning (*M*=3.86, *SD*=1.14) and web-enhanced instruction (*M*=3.58, *SD*=1.22). Students' perceptions of distance learning (*R*=.61) and their web-enhanced perceptions (*R*=.60) were substantially related to the dependent variable—interaction benefit. There were five independent variables moderately associated with interaction benefit: Web-enhanced perceptions (*R*=.48), self-efficacy (*R*=.48), intrinsic value (*R*=.41), and cognitive strategies (*R*=.39). There was a low relationship between self-regulated strategies and interaction benefit (*R*=.28). The highest correlation coefficient from the two perception domains and the highest correlation coefficient from the four motivated learning strategies domains were simultaneously entered into a multiple linear regression model. This method was chosen because N=42 (1:21 k/n ratio). The full model (Table 3) was significant ($p<.001$). Distance learning perceptions and self-efficacy explained 60% of the variance in interactive benefit (Full Model: $R^2 = .60$; Adjusted $R^2 = .58$; $F = 29.18$; $p<.001$, Constant=2.26). Both independent variables were significant. Distance learning perception accounted for 37% unique variance (*B*=.99, *SE B*=.17, β=.61, t=5.98, $p<.01$). Self-efficacy accounted for 22% unique variance (*B*=.1.00, *SE B*=.22, β=.47, t=4.67, $p<.01$). An examination of the residuals showed the assumptions were not violated. Furthermore, there was no concern of multicollinearity in this model (Tolerance=0.00, VIF=0.00).

Table 1. Student ratings of variables related to interaction in a distance- and technology-situated environment (N = 42)

Variables	*N*	M	SD
Your access to the instructor at the main campus site (IVC-1st)	42	12.74	3.44
The cooperative learning groups (IVC-2nd)	42	12.69	3.07
Hands-on learning activities in the distance classroom (IVC-3rd)	42	12.60	3.43
Response time from instructor via e-mail (WEI-3rd)	42	12.21	3.28
Peer teaching in the distance learning (DL) classroom (IVC-6th)	42	11.69	3.64
Your access to instructor at off-campus, ATC site (IVC-8th)	38	10.74	3.67
Your opportunity to discuss in the DL environment (IVC-9th)	42	10.45	3.47
Teaching with distance learning technologies (IVC-11th)	42	10.36	3.46
Personal contact with the instructor at the distance site (IVC-12th)	40	10.35	3.63
Asking the instructor questions via WebCT (WEI-9th)	40	10.33	3.33
Communicating with other students electronically (WEI-10th)	42	10.26	3.18
Interaction with instructors via WebCT (WEI-11th)	42	10.12	3.06
Personal contact with the other students at distance site (IVC-13th)	41	9.95	4.04
Interaction with other students via WebCT (WEI-12th)	42	9.79	3.08

Note. Scale: 0 = Absolutely hindered, 3 = Mostly hindered, 5 = Moderately hindered, 6 = Somewhat hindered, 7 = Slightly hindered, 8 = Hindered/Helped (neutral), 9 = Slightly helped, 10 = Somewhat helped, 11 = Moderately helped, 13 = Mostly helped, 16 = Absolutely helped

Table 2. Summary Data: Regression of Interaction Benefit and Teacher-Instruction Benefit in Distance- and Technology-Situated Learning Environments on Motivated Learning Strategies and Perceptions (N = 42)

Variables	Intercorrelations								
	X_1	X_2	X_3	X_4	X_5	X_6	Y_1	M	SD
Cognitive Strategies (X_1)	1.00	.46*	.35*	.54*	.28	.27	.39*	4.62	.73
Intrinsic Value (X_2)		1.00	.78*	.22	.24	.39*	.41*	4.96	.92
Self-Efficacy (X_3)			1.00	.38*	.02	.30	.48*	4.92	.88
Self-Regulated Strat. (X_4)				1.00	.00	.10	.28	4.07	.57
DL Perceptions (X_5)					1.00	.63*	.61*	3.86	1.14
WEI Perceptions (X_6)						1.00	.48*	3.58	1.22
Interaction Benefit (Y_1)							1.00	11.01	1.86

Note. *p < .05, two-tailed. The MSLQ scale for X_1, X_2, X_3, X_4: 1=Not at all true of me, 2=Not very true of me, 3=Somewhat true of me, 4=Quite true of me, 5=Mostly true of me, 6=Almost always true of me, and 7=Very true of me. The perception scale for X_5 and X_6: 1=Strongly disagree, 2=Moderately disagree, 3=Slightly disagree, 4=Slightly agree, 5=Moderately agree, and 6=Strongly agree.

Table 3. Summary of Simultaneous Regression Analysis for Variables Predicting Interaction Benefit in a Distance- and Technology-Situated Learning Environment (N = 42)

Variables	Full Model				
	B	SE B	β	t	P
Distance Learning Perceptions (X_5)	.99	.17	.61	5.98	<.01
Self-Efficacy (X_3)	1.00	.22	.47	4.67	<.01
(Constant)	2.26				

Note. Full Model: R^2 = .60; Adjusted R^2 = .58; F = 29.18; p<.001

Conclusions and Recommendations

The variables that helped students learn in a distance- and technology-situated environment were related to interaction among students and the instructors. One plausible reason for the accessibility to the instructor at the on-site getting ranked first was that the instructor spent 90 percent of his time at the main campus site where 34 of the 42 students were located. However, the students in a distance learning classroom were helped most by instructional methods, strategies, activities, and tactics that promoted student interaction, which was congruent with other studies (Born & Miller, 1999; McCaslin & Torres, 1992; Miller, 1992; Miller, 1995; Miller & Honeyman, 1993; Miller & Shih, 1999a; Pilcher & Miller, 2000). The findings of this study supported the positions of several agricultural educators that constructivist approaches to learning are more advantageous in distance- and technology-situated environments because they focus on active student interaction (Miller & Pilcher, 2000; Miller & Shih, 1999b; Murphy, 1999; Pilcher & Miller, 2000). Furthermore, the conclusion that the focus of instructional design and strategies should be on the learning process more than the technology

itself was congruent with Clark (1994), Educause (1999), Miller and Honeyman (1994), and Sherry (1996). Furthermore, the 14 variables that promoted student interaction and helped learning provides a tenable impression that students can learn in a distance- and technology-situated environment. This conclusion was consistent with other studies on distance learning (The Institute for Higher Education Policy, 1999; Russell, 1999). Moreover, the findings from this study supported several benchmarks for success in internet-based distance education (The Institute for Higher Education Policy, 2000) because (a) the course was designed to engage students in analysis, synthesis, and evaluation of their course through the modified Delphi technique, (b) student interaction with the two instructors and other students was essential and was facilitated in a variety of ways, (c) feedback to students was constructive and provided in a timely manner, (d) the program's educational effectiveness and teaching-learning process was assessed through an evaluation process that used several methods, and, (e) intended learning outcomes were reviewed regularly.

Student perceptions of distance learning and web-enhanced instruction and their self-efficacy, intrinsic motivation value, and cognitive strategies should be considered as important characteristics that can influence how much learning benefit students receive from methods, strategies, and tactics that promote interaction in a distance- and technology-situated environment, which supported Murphy's (1999) finding. Moreover, this conclusion was congruent with Pilcher and Miller's (2000) assertion that learning strategies empower students to learn in a distance-situated environment. Specifically, the two most important characteristics, which influenced student learning by benefiting from interaction in the introductory agricultural education course, were distance learning perceptions and self-efficacy. The finding that self-efficacy, a motivational belief that "I can do it," plays a significant influence in the learning process was consistent with Shih and Gamon (1998), "Student motivation seemed to play a very important role in web-based learning" (p. 380). Other studies related to self-efficacy and computers in education were also congruent with this conclusion. The instructor's confidence in using computers was a significant factor in McCaslin and Torres's (1992) study. Further, Smith and Kotrlik (1990) concluded that computer anxiety affected the mastery of computer skills.

Using the regression equation from this study, it can be predicted that students with a moderately positive perception of distance learning and a self-efficacy mean of "almost always true of me," would mostly benefit from interaction in the introductory agricultural education course (Estimated Interaction Benefit = 2.26 + (.99)(DL Perception) + (1.00)(Self-Efficacy). Therefore, agricultural educators should design and implement methods and strategies and invest in resources that promote student interaction, which was consistent with Pilcher and Miller's (2000) recommendation. Further, agricultural educators should also promote positive perceptions toward distance learning by projecting a positive attitude and creating a positive climate for learning in a distance- and technology-situated environment. Day, Raven, and Newman (1998) recommended that student attitudes be evaluated when instructional changes occur when using educational technologies. Agricultural educators should also develop and build students' self-efficacy towards learning in a distance- and technology-situated environment. Self-efficacy can be developed through mastery experiences, observations, coaching, and controlling one's physical state (Bandura, 1997). Miller and Shih (1999b) recommended that teachers should encourage students to expend effort in meeting challenging learning expectations. Further, Quinlan and Martin (1990) found that encouragement received

by the user resulted in higher computer use. Kotrlik, Redmann, Harrison, and Handley's (2000) recommendation that preservice agricultural education programs should help new teachers develop self-regulated learning strategies in learning information technology was not supported by this study. However, Birkenholz and Stewart's (1992) recommendation that teacher educators should assist preservice teachers in developing computer and technology knowledge and skills was supported by this study.

Agricultural educators need to consider student perceptions and self-efficacy when designing, implementing, and evaluating distance learning courses. Future studies should continue to be conducted in distance learning to determine what variables may change due to the changes in the content, instructional methods, learning activities, and educational contexts. Future inquiry should also investigate if relationships among intrinsic motivation value, cognitive strategies, and other learning strategies can be explained to other critical variables in the teaching-learning process. Factor analysis should be investigated to determine constructs among the learning variables reported by learners. Moreover, relationships among what students identified as being helpful to their learning should be investigated to determine if achievement can be explained and predicted. Further, this evaluation assessment process should be investigated to determine the educational value of students' strategic processes resulting in higher levels of cognition, metacognition and self-regulation.

References

Andriole, S. J. (1997). Requirements-driven ALN course design, development, delivery, and evaluation. Journal of Asynchronous Learning Networks, 1(2), 1-10. Retrieved July 24, 2000 from the World Wide Web: http://www.aln.org/alnweb/journal/jaln_vol1issue2.htm

Bandura, A. (1997). Self-efficacy: The exercise of control. New York: W. H. Freeman.

Birkenholz, R. J., & Stewart, B. R. (1991). The use of instructional technologies in agricultural education. Journal of Agricultural Education, 32(2), 40-48.

Born, K. A., & Miller, G. (1999). Faculty perceptions of web-based distance education in agriculture. Journal of Agricultural Education, 40(3), 30-39.

Bourne, J. R., McMaster, E., Rieger, J., & Campbell, J. O. (1997). Paradigms for on-line learning: A case study in the design and implementation of an asynchronous learning networks (ALN) course. Journal of Asynchronous Learning Networks, 1(2), 1-10. Retrieved July 24, 2000 from the World Wide Web: http://www.aln.org/alnweb/journal/jaln_vol1issue2.htm

Broad, M. C. (1999). The dynamics of quality assurance in on-line distance education. Journal of Instructional Science and Technology, 3(1), 1-12. Retrieved July 24, 2000 from the World Wide Web: http://www.usq.edu.au/electpub/e-jist/vol3no1/index.htm

Clark, R. E. (1994). Media will never influence learning. Educational Technology Research and Development, 42(2), 21-29.

Clark, R. E., & Salomon, G. (1986). Media in teaching. In Wittrock, M. C., (Ed.), Handbook of research on teaching. London: Collier Macmillan.

Day, T. M., Raven, M. R., & Newman, M. E. (1998). The effects of World Wide Web instruction and traditional instruction and learning styles on achievement and changes in student attitudes in a technical writing in agricommunication course. Journal of Agricultural Education, 39(4), 65-75.

Educause. (1999). The future of learning: An interview with Alfred Bork. Educom Review, 34(4), 1-12. Retrieved on July 7, 2000 from the World Wide Web: http://www.educause.edu/ir/library/html/erm9946.html

Graham, M., Scarborough, H., & Goodwin, C. (1999). Implementing computer mediated communication in an undergraduate course: A practical experience. Journal of Asynchronous Learning Networks, 3(1), 1-13. Retrieved July 24, 2000 from the World Wide Web: http://www.aln.org/alnweb/journal/jaln-vol3issue1.htm

Gutierrez, J. J. (2000). Instructor-student interaction. Education at a Distance, 14(3). Retrieved on July 24, 2000, from the World Wide Web: http://www.usdla.org/ED_magazine/illuminactive/March_Issue/Instructorstudent.htm

Kelly, M. (1990). Course creation issues in distance education. Education at a distance: From issues to practice, 77-99. Malabar, FL: Robert E. Krieger Publishing Company.

Knobloch, N. A. (2000, August). Distance learning: Is it working? Paper presented at the "Kick-IT Up A Notch" Second Annual Conference for Technology Enhanced Learning and Research, Columbus, OH. Retrieved January 18, 2001 from the World Wide Web: http://telr.ohio-state.edu/conferences/kickitup/knobloch.html

Kotrlik, J. W., Redmann, D. H., Harrison, B. C., & Handley, C. S. (2000). Information technology related professional development needs of Louisiana agriscience teachers. Journal of Agricultural Education, 41(1), 18-29.

Kupritz, V. W. (2000). The medium is the message: Implications for teaching in cyberspace. Journal of Instructional Science and Technology, 3(2), 1-4. Retrieved July 24, 2000 from the World Wide Web: http://www.usq.edu.au/electpub/e-jist/vol3no2/index.htm

McCaslin, M., & Good, T. (1996). The informal curriculum. In Berlinger, D. C., & Calfee, R. C. (Eds.), Handbook of educational psychology. New York: Simon & Schuster Macmillan.

McCaslin, N. L., & Torres, R. M. (1992). Factors underlying agriculture teachers' attitudes toward using microcomputers for inservice education. Journal of Agricultural Education, 33(3), 47-52.

McIsaac, M. S., & Gunawardena, C. N. (In press). Distance education. In Jonassen, D. (Ed.), Handbook research on educational communications and technology. Retrieved July 24, 2000 from the World Wide Web: http://earthvision.asu.edu/~laurie/mcisaac/distance.htm

McKeachie, W. J., Pintrich, P. R., Lin, Y., & Smith, D. (1986). Teaching and learning in the college classroom: A review of the research literature. Ann Arbor, MI: National Center for Research to Improve Postsecondary Teaching and Learning, University of Michigan.

Miller, B. E. (1992). Participant motivation in off-campus agriculture credit program. Journal of Agricultural Education, 33(2), 2-9.

Miller, G. (1995). Iowa data: Professional agricultural degree program graduates assess their videotape instruction experience as distant learners. NACTA Journal, 34(4), 26-29.

Miller, G. (1998). Learning strategy and learning characteristic variables related to achievement in agriculture courses delivered by videotape. Journal of Agricultural Education, 39(4), 37-44.

Miller, G., & Honeyman, M. (1994). Attributes and attitudes of students enrolled in agriculture off-campus videotaped courses. Journal of Agricultural Education, 34(3), 85-92.

Miller, G., & Pilcher, C. L. (2000). Are off-campus courses as academically rigorous as on-campus courses? Journal of Agricultural Education, 41(2), 65-72.

Miller, G., & Shih, C. C. (1999a). A faculty assessment of the academic rigor of on- and off-campus courses in agriculture. Journal of Agricultural Education, 40(1), 49-56.

Miller, G., & Shih, C. C. (1999b). Comparing quality in on-campus courses: Perceptions of College of Agriculture faculty. Journal of Agricultural Education, 40(2), 28-39.

Murphy, T. H. (1999). A qualitative analysis of instructor-student verbal interaction in a two-way audio two-way video distance education setting. Journal of Agricultural Education, 40(3), 50-60.

Phipps, R., Wellman, J., & Merisotis, J. (1998) Assuring quality in distance learning: A preliminary review. Retrieved July 24, 2000 from the World Wide Web: http://www.ihep.com/PUB.html Washington, DC: The Institute for Higher Education Policy.

Picciano, A. G. (1998). Developing an asynchronous course model at a large, urban university. Journal of Asynchronous Learning Networks, 2(1), 1-12. Retrieved July 24, 2000 from the World Wide Web: http://www.aln.org/alnweb/journal/jaln_vol2issue1.htm

Pilcher, C., & Miller, G. (2000). Learning strategies for distance education students. Journal of Agricultural Education, 41(1), 60-68.

Pintrich, P. R., Smith, D. A. F., Garcia, T., & McKeachie, W. J. (1991). A manual for the use of the motivated strategies for learning questionnaire (MSLQ). (Report No. NCRIPTAL-91-B-004). Ann Arbor, MI: National Center for Research to Improve Postsecondary Teaching and Learning. (ERIC Document Reproduction Service No. ED 338 122)

Quinlan, D., & Martin, R. A. (1990). Evaluation of on-farm computer use. Journal of Agricultural Education, 31(1), 7-11.

Russell, T. L. (1999). The no significant difference phenomenon. Chapel Hill: NC: Office of Instructional Telecommunications, North Carolina State University. Retrieved July 24, 2000 from the World Wide Web: http://cuda.teleeducation.nb.ca/significantdifference/

Sherry, L. (1996). Issues in distance learning. International Journal of Educational Telecommunications, 1(4), 337-365. Retrieved July 24, 2000 from the World Wide Web: http://www.cudenver.edu/~lsherry/pubs/issues.html

Shih, C. C., & Gamon, J. (1998). Web-based learning: Student learning styles, motivation, attitude, and achievement. Proceedings of the 25th National Agricultural Education Research Meeting, 377-383.

Smith , M. N., & Kotrlik, J. W. (1990). Computer anxiety of Extension agents. Journal of Agricultural Education, 31(1), 12-17.

Smith, S., Tyler, J. M., & Benscote, A. (2000). Internet supported teaching: Advice from the trenches. Education at a Distance, 13(1), 1-12. Retrieved July 24, 2000 from the World Wide Web: http://www.usdla.org/ED_magazine/illuminactive/JAN_1999/Internet.htm

The Institute for Higher Education Policy. (1999). What's the difference: A review of contemporary research on the effectiveness of distance learning in higher education. Washington, DC: Author. Retrieved July 24, 2000 from the World Wide Web: http://www.ihep.com/PUB.htm

The Institute for Higher Education Policy. (2000). Quality on the line: Benchmarks for success in internet-based distance education. Washington, DC: Author. Retrieved July 24, 2000 from the World Wide Web: http://www.ihep.com/PUB.htm

U.S. Department of Education. (1999). Distance education at postsecondary education institutions: 1997-98 (National Center for Education Statistics Publication No. 2000-013). Jessup, MD: Author. Retrieved July 24, 2000 from the World Wide Web: http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2000013

Warren, R. D., Klonglan, G. E., & Sabri, M. M. (1969). The certainty method: Its application and usefulness in developing empirical measures in social sciences. Rural Sociology Report No. 82. Ames, IA: Iowa State University.

Wegerif, R. (1998). The social dimension of asynchronous learning networks. Journal of Asynchronous Learning Networks, 2(1), 1-15. Retrieved July 24, 2000 from the World Wide Web: http://www.aln.org/alnweb/journal/jaln_vol2issue1.htm

Characteristics of Learner's
Explaining the Benefit of Student Interaction
in a Distance and Technology Situated Environment

A Critique

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The area investigated by this study is very important to not only the profession of agricultural education, but education in general whether at the post secondary or secondary level. Economic pressures and societal expectations confronting education demand efficiency and efficacy. One consideration available to explore in addressing these expectations is the use of distance learning. This delivery method has the potential to extend technology and information availability to a broader audience. It provides an avenue to more efficient articulation between levels of education, thus potentially minimizing the inefficiency of needless duplication. However, the area needs a knowledge base from which to make decisions to address these areas of efficiency.

In a review of literature, several key elements to distance learning are identified as instructor/technology interaction, instructor/technology/student interaction, student/student interaction, instructional methodology, and instructional skill. The basis for connection of a theoretical framework for this study to agricultural education as stated by the author is not clear. Also, although a purpose is stated, there is some confusion between what is identified as a focus for the study and the stated purpose. No objectives are identified for the study.

The design and procedures of this study are very ambitious in the exploration of (1) identifying helpful/hindering course strategies, (2) learner perception of distance learning/web-enhanced instruction, and (3) inter-correlated learning strategies. The explanation of procedure and coding makes this section difficult to follow and interpret. A definitive explanation of the four domains of learning strategies in the MSLQ would be very helpful to interpret that aspect of the study.

The study attained a very good response rate of 98%. The reporting of variables related to interaction is very interesting and raises several questions. Most of which deal with facilitation activities of learning groups, and user support of the technology. It would also be as valuable to see the list of variables hindering learning as the list which was helpful. The recommendations and conclusions of this study were related to and supported by the literature citations provided in the reports introduction. It may have been helpful for the researcher to be more prescriptive for practitioners if specific objectives for the study would have been developed. Possibly based on questions from the practitioner field. However, the recommendations of considering student perception and self efficacy when designing and implementing distance learning courses are well founded.

THE PROFESSIONAL DEVELOPMENT NEEDS OF KANSAS TEACHERS OF AGRICULTURE

Introduction/Theoretical Framework

In today's ever changing world, teachers of agriculture are expected to know more, teach a more technologically advanced curriculum, and meet the increasing demands of a diverse student population. They are being asked to keep up-to-date with rapid advances in technology in the agriculture, food, and fiber industry. They are being faced with the task of incorporating educational technology into their instructional programs. In addition, they are being asked to meet the needs of a growing diverse student population and reach out to new audiences. Professional development activities and learning experiences are one way vocational teachers can be provided the knowledge and skills needed to successfully meet the demands of a changing educational environment and advances in technology (Niven, 1993).

Agriculture teachers have had and continue to have a need for professional development. Professional development programs are often developed to reflect the current trends in education or new developments in the agriculture, food, fiber, and natural resource industry. Professional development programs typically are designed for all agriculture teachers in a particular state without regard to years of teaching experience or geographic location. Some states have conducted separate beginning teacher sessions for those individuals in their first and/or second year of teaching

The professional development needs of beginning teachers of agriculture have been assessed in prior research (Kahler, 1974; Hillison, 1977; Shippy,1981; Hachmeister, 1981; Claycomb & Petty, 1983; Birkenholz & Harbstreit, 1987; Valli, 1992; Garton & Chung, 1996, Briars & Edwards 1998). Beginning teachers indicated concern with managing student behavior, motivation, dealing with individual differences, assessing students' work, relationships with parents, organization of class work, insufficient and/or inadequate teaching materials and supplies, and dealing with problems of individual students (Veeman, 1984). Garton and Chung (1996) found that beginning agriculture teachers rated technical agriculture competencies lower when compared to professional competencies in the areas of instruction, program planning and evaluation, and program administration. A conclusion drawn from the previous research is that agriculture teachers, early in their careers, were more concerned with their development of pedagogical skills than the technical content they teach.

While beginning teachers have specific professional development needs, the needs of teachers appear to change with teaching experience and maturation (Claycomb & Petty, 1983). A growing pool of research has been conducted identifying the inservice needs of agriculture teachers within selected states. Gamon, et. al. (1994) found that agriculture teachers needed training in agricultural environmental impact, natural resource management, government policy, impact of the global market, and the processing of agricultural products. King and Garton (2000) identified the use of computers, writing grant proposals, attracting quality students, biotechnology applications, and landscaping as areas of high inservice need for teachers in Missouri. Agriculture teachers in South Carolina desired up-dates and assistance with using

computers and related technology, preparing award applications, record keeping, public relations, adult education, and developing Supervised Agricultural Experience opportunities (Layfield & Dobbins, 2000). Though similarities exist between the findings of studies conducted in other states, the question remains, do agriculture teachers in Kansas have similar professional development needs?

In many states, geography dictates not only a difference in agriculture, but also a difference in agricultural education. King and Garton (2000) focused on the varying needs of teachers by geographic region as well as those of beginning teachers compared to more experienced teachers. As many states conduct inservice programs on a district-by-district basis, additional information is needed to plan and coordinate professional development programs to meet the needs of agriculture teachers by geographic region.

While previous studies primarily focused on technical agriculture issues, only recently have researchers begun to examine the total agriculture program and teachers' responsibilities (King & Garton, 2000, Layfield & Dobbins, 2000). Additional examinations of the professional development needs of agriculture teachers in relation to all aspects of the secondary agriculture program should be conducted.

Purpose and Objectives

The purpose of this study was to identify the professional development needs of secondary agriculture teachers in Kansas. The specific objectives of the study were to:

1. Identify the professional development needs of secondary agriculture teachers.
2. Compare the professional development needs of secondary agriculture teachers by the seven geographic districts within the state.
3. Compare the professional development needs of secondary agriculture teachers by years of teaching experience.

Procedures

The research method employed was descriptive survey. The population consisted of a census of secondary agriculture teachers in the state of Kansas ($N = 175$).

An instrument to assess the professional development needs of agriculture teachers was developed by the researchers based upon a review of the literature (Foxwell, 1987; Neason, 1992; Garton & Chung, 1996; Briers & Edwards, 1998). The instrument was reviewed by a panel of experts consisting of teacher educators, state supervisors, and agriculture teachers for face and content validity. After suggestions by the panel of experts were taken into account, modifications resulted in a 54 item instrument. The items were grouped into four categories: 1) Program Management and Planning, 2) Student and Teacher Development, 3) Instruction and Curriculum, and 4) Technical Agriculture. Internal consistency for each of the four sections was established with a sample of teachers from a neighboring state and ranged from .80 to .89 (Cronbach's alpha coefficient).

Data Collection and Analysis

The professional development needs instrument was administered at the teachers' summer professional conference. Instruments were administered during a general business session, with respondents signing a card indicating they had completed and returned the instrument, therefore providing anonymity to respondents. Teachers that did not attend the general business session were mailed the instrument. A total of 55 instruments were collected during the summer conference, with an additional 77 collected by mail. The total number of usable questionnaires was 131, resulting in a response rate of 75%.

Descriptive statistics were generated on individual items. A descending list was generated to determine the items with the greatest professional development need, as was a descending list in each of the four topic categories. Similar lists were generated for each of the seven geographic districts, and according to years of teaching experience.

Results/Findings

The first objective sought to identify the professional development needs of secondary agriculture teachers. The two highest rated items among all agriculture teachers were preparing proficiency and degree applications (3.93) and writing grant proposals for external funding (3.85) (Table 1). The next three topics, in order, were designing and modifying curriculum and course offerings to attract high quality students (3.80), modifying the curriculum to meet changes in technology (3.76), and recruiting and retaining high quality students (3.69).

Of the 54 items, means ranged from 3.93 to 2.67. When considering the 25% (items 1-14) with the greatest need for professional development in relation to the four categories, six were classified in technical agriculture, three in instruction and curriculum, three in program management and planning, and two in student and teacher development. When considering the next 14 items (26%-50%), seven items were in technical agriculture, three in instruction and curriculum, three in program management and planning, and one in student and teacher development.

Table 1
Secondary Agriculture Teachers' Perceived Need for Professional Improvement

Rank	Item	Category	M	SD
1.	Preparing proficiency and degree applications	STD	3.93	.95
2.	Writing grant proposals for external funding	PMP	3.85	1.13
3.	Designing and modifying curriculum and course offerings to attract high quality students	IC	3.80	.95
4.	Modifying the curriculum to meet changes in technology	IC	3.76	.89
5.	Recruiting and retaining quality students	PMP	3.69	1.02
6.	Advances in Biotechnology	TA	3.65	1.01

7.	Using computer technology and computer applications (spreadsheets, presentation software, etc.)	IC	3.60	1.04
7.	Building the image of agriculture programs and courses	PMP	3.60	1.01
9.	Computer Applications in Agriculture	TA	3.56	1.02
10.	Record keeping skills	TA	3.50	1.04
11.	Preparing for Career Developments Events	STD	3.47	.96
12.	Genetic Engineering	TA	3.46	1.00
13.	Animal Reproduction – A.I. and Embryo Transfer	TA	3.44	1.05
14.	Agricultural Sales and Marketing	TA	3.40	.97
15.	Financial Management	TA	3.38	.94
16.	Motivating students – teaching techniques and ideas	IC	3.37	1.03
16.	Meat Science	TA	3.37	.98
18.	Developing SAE opportunities for students	STD	3.34	1.13
19.	Greenhouse Operation and Management	TA	3.33	1.13
19.	Integrating agriscience into the curriculum	IC	3.33	.94
21.	Global Positioning Systems (GPS)	TA	3.31	1.07
22.	Completing reports for local and state administrators	PMP	3.29	1.06
23.	Managing learning laboratories (Mechanics, Horticulture)	IC	3.28	1.05
24.	Animal Nutrition	TA	3.24	.99
24.	Evaluating the local agriculture program	PMP	3.24	.99
26.	Utilizing a local advisory committee	PMP	3.23	.99
27.	Electricity and Controls	TA	3.22	1.05
28.	Soil Science	TA	3.21	.97
29.	Ag Mechanic Project Construction	TA	3.20	1.22
30.	Developing business/community relations	PMP	3.19	.96
30.	Teaching students problem-solving and decision making skills	IC	3.19	.95
32.	Natural Resource Management	TA	3.18	1.07
32.	Supervising SAE programs – traditional and non-traditional	STD	3.18	1.04
32.	Managing and reducing work-related stress	STD	3.18	1.15
32.	Landscaping	TA	3.18	1.09
36.	Tissue Culture	TA	3.14	1.10
37.	Time Management tips and techniques	STD	3.11	1.09
38.	Planning and conducting FFA chapter activities	STD	3.10	.93

39.	Water Quality	TA	3.09	.94
40.	Food Science and Food Safety	TA	3.06	1.02
41.	Developing professionally	STD	3.04	1.00
42.	Conducting needs assessments and surveys to assist in planning the secondary program	PMP	2.98	.96
42.	Tool and Machine Conditioning Repair	TA	2.98	1.15
44.	Planning and effective use of block scheduling	PMP	2.97	1.30
44.	Establishing a working relationship with local media	PMP	2.97	.91
46.	Planning and maintaining a school land lab	PMP	2.94	1.14
47.	Floriculture	TA	2.92	1.12
48.	Hydraulics	TA	2.89	1.04
49.	Production Agricultural Machinery	TA	2.87	1.05
50.	Managing student behavior	IC	2.86	1.01
50.	Waste Management	TA	2.86	.97
52.	Oxy-Acetylene Welding and Plasma Cutting	TA	2.80	1.13
53.	Organizing an Alumni Association	STD	2.78	1.14
54.	Small Engine Technology	TA	2.67	1.21

NOTE: Items rated on 5-point scale (1=No Need, 2=Some Need, 3=Moderate Need, 4=Strong Need, 5=Extreme Need). TA=Technical Agriculture, IC=Instruction and Curriculum, PMP=Program Management and Planning, STD=Student and Teacher Development

The second objective sought to compare the professional development needs of agriculture teachers by the seven geographic districts in the state of Kansas, as determined by the teachers' professional organization. The results indicated similarities and differences in the professional development needs between each of the seven districts (Table 2). Only three items, preparing proficiency and degree award applications, writing grant proposals for external funding, and designing and modifying curriculum and course offerings to attract high quality students were rated in the top ten for all seven districts. The first ten items identified in the table represent items with the greatest need for professional development for the seven districts combined. The remaining items in the table denote topics identified by individual districts as a strong need for professional development, but not by the entire group. Modifying curriculum to meet changes in technology was in the top ten for all but one district.

Table 2

Ranking of Professional Development Needs by Geographic Area of the State

ITEM	Overall Rating	Northwest n=17	North Central n=22	Northeast n=17	East Central n=18	Southeast n=17	South Central n=24	Southwest n=15
Prepare proficiency / degree applications	1	3 (4.11)	3 (4.00)	1 (3.94)	1 (4.22)	1 (3.94)	1 (4.04)	6 (3.73)
Write grant proposals for external funding	2	1 (4.42)	3 (4.00)	1 (3.94)	6 (3.72)	4 (3.65)	4 (3.87)	2 (3.93)
Design / modify curriculum and course offerings to attract quality students	3	5 (3.95)	2 (4.14)	4 (3.59)	4 (3.83)	3 (3.71)	1 (4.04)	7 (3.67)
Modify curriculum to meet changes in technology	4	6 (3.89)	1 (4.23)	4 (3.59)	3 (4.00)		4 (3.87)	2 (3.93)
Recruit and retain quality students	5	2 (4.21)	5 (3.95)	4 (3.59)			3 (3.96)	4 (3.87)
Advances in Biotechnology	6	8 (3.74)	5 (3.95)		2 (4.11)	7 (3.47)		
Use computer technology and computer apps.	7		9 (3.82)	4 (3.59)				1 (4.07)
Build the image of agriculture programs	7	6 (3.89)	5 (3.95)			7 (3.47)	6 (3.78)	
Computer Applications in Agriculture	9		9 (3.82)	4 (3.59)		6 (3.53)		5 (3.80)
Record keeping skills	10	9 (3.68)		10 (3.53)	9 (3.61)			7 (3.67)
Prepare for Career Development Events	11			4 (3.59)		2 (3.76)	8 (3.67)	
Genetic Engineering	12				5 (3.78)			
Animal Repro. – A.I./ Embryo Transfer	13			3 (3.76)		10 (3.41)	10 (3.58)	
Ag Sales and Marketing	14	10 (3.63)			8 (3.67)			7 (3.67)
Motivate Students - teaching techniques/ideas	16							7 (3.67)
Meat Science	16	4 (4.05)				5 (3.59)		
Developing SAE opportunities for students	18				9 (3.61)		9 (3.63)	
Global Positioning Systems (GPS)	21				6 (3.72)			
Animal Nutrition	24		8 (3.91)					
Ag Mechanic Project Construction	29					7 (3.47)		
Supervising SAE programs– traditional and non-traditional	32						7 (3.75)	

Note: Rating (Mean)

The final objective sought to compare the professional development needs of secondary agriculture teachers by years of teaching experience. Teachers were divided into four categories: Five years or less, six to 10 years, 11 to 20 years, and more than 20 years of teaching experience. Of the ten items with a high overall need for professional development, only three were identified by all teachers, regardless of years of experience.

The three expressed needs for professional development in the top ten for all groups were: 1) preparing proficiency and degree applications, 2) designing and modifying curriculum and course offerings to attract high quality students, and 3) modifying the curriculum to meet changes in technology (Table 3). Writing grant proposals for external funding, recruiting and retaining quality students, and building the image of agriculture programs and courses were needs for all teachers with the exception of teachers with 20 years experience or more. Inservices regarding advances in biotechnology were desired by teachers in all groups except those with five years teaching experience or less. Computer applications in agriculture was rated as very important by teachers with five years or less experience and by teachers with more than 20 years of experience, but not teachers from six to 20 years experience.

Table 3
Professional Development Need by Years of Experience

ITEM	OVERALL	5 OR LESS n=41	6-10 n=19	11-20 n=40	MORE THAN 20 n=31
Preparing proficiency and degree applications	1	2 (4.05)	3 (4.11)	2 (3.75)	2 (3.90)
Writing grant proposals for external funding	2	1 (4.13)	1 (4.42)	7 (3.52)	
Designing and modifying curriculum and course offerings to attract high quality students	3	4 (3.90)	5 (3.95)	3 (3.73)	4 (3.68)
Modifying the curriculum to meet changes in technology	4	5 (3.76)	6 (3.89)	1 (3.78)	4 (3.68)
Recruiting and retaining quality students	5	3 (3.95)	2 (4.21)	10 (3.33)	
Advances in Biotechnology	6		8 (3.74)	4 (3.68)	10 (3.58)
Using computer technology and computer applications (spreadsheets, presentation software, etc.)	7			5 (3.58)	1 (3.94)
Building the image of agriculture programs and courses	7	7 (3.70)	6 (3.89)	9 (3.42)	
Computer Applications in Agriculture	9	8 (3.68)			3 (3.74)
Record keeping skills	10		9 (3.68)		7 (3.61)
Preparing for Career Developments Events	11				7 (3.61)
Genetic Engineering	12			6 (3.57)	
Animal Reproduction – A.I. and Embryo Transfer	13			8 (3.45)	
Agricultural Sales and Marketing	14		10 (3.63)		
Financial Management	15				4 (3.68)
Meat Science	16		4 (4.05)		
Developing SAE opportunities for students	18	6 (3.71)			
Greenhouse Operation and Management	19	9 (3.66)			
Global Positioning Systems (GPS)	21				7 (3.61)
Ag Mechanic Project Construction	29	9 (3.66)			

NOTE: Ranking (mean)

Conclusions/Implications/Recommendations

Agriculture teachers indicated that their greatest need for professional development was in preparing proficiency and degree applications, writing grant proposals for external funding, designing and modifying curriculum and course offerings to attract high quality students, modifying the curriculum to meet changes in technology, and recruiting and retaining high quality students. Although the perceived needs in the top 25% (14 items) included more technical agriculture items than items classified as student and teacher development, instruction and curriculum, and program management and planning, the five items with the greatest need did not include technical agriculture topics.

When considering professional development needs according to geographic areas, more similarities were found among the seven districts than differences. The three areas of greatest need identified by the total group of teachers were ranked in the top ten by each of the seven districts. Modifying the curriculum to meet changes in technology was ranked in the top ten by six of the seven districts and recruiting and retaining quality students was a high-ranking need by all but two districts. Six items were included in one district's top ten, but were not included in the remaining six districts. The items were: genetic engineering, motivating students – teaching techniques and ideas, global positioning systems, animal nutrition, agriculture mechanics project construction, and supervising SAE programs – traditional and non-traditional.

Determining professional development needs according to years of teaching experience revealed there were similar needs. Teachers with five years or less experience did not feel as strongly about the need for professional development in advances in biotechnology and using computer technology and computer applications. This finding possibly reflects more recent exposure to biotechnology in a university setting and the increased usage of computer technology in pre-service education. However, these same teachers identified computer applications in agriculture as an important need, indicating they felt comfortable using computers and general software programs, but were not as comfortable with the applications used in the industry of agriculture. Teachers with five years experience or less identified technical agriculture topics in only the three lowest ranking items in the top ten. This emphasis on areas other than technical agriculture by less experienced teachers is consistent with the findings of previous research (Claycomb & Petty 1983; Garton & Chung, 1996). Beginning teachers also ranked three items in the top ten that were not identified by teachers with more experience. These traditional areas of need for beginning teachers included: Developing SAE opportunities for students, greenhouse operation and management, and agricultural mechanics project construction.

Teachers with more than 20 years of experience identified using computer technology and computer applications (spreadsheets, presentation software, etc.) and computer applications in agriculture as the items of the first and third highest need respectively. This strong response to computer related information would imply that those teachers with more than 20 years experience recognize the importance of computers in their students' lives and want training to meet the expectations of their students. This group of teachers also excluded three items identified by all other groups of teachers: Writing grant proposals for external funding, recruiting and retaining quality students, and building the image of agriculture programs and courses. These findings imply that more experienced teachers have identified adequate sources of funding for their programs and don't perceive the image of their programs and courses to be as great a problem as do those teachers with fewer years of experience.

Considering the mean scores of the highest rated items for the entire group of teachers, no item had a mean above 4.0, indicating a strong need for professional development. The absence of scores above 4.0 leads one to consider whether the correct items were considered, or were teachers generally prepared in the areas addressed by the items included. On the questionnaire, an open-ended item asked respondents to suggest topics for professional development not

included on the instrument. Of the 131 instruments returned, only seven other topics were suggested, three of those seven comments related to modifying the curriculum to meet increasing academic requirements. This would imply that an item pertaining to this topic should be included in future needs assessments.

When planning professional development activities, the Kansas Professional Development and Inservice Committee should use the results of this study to prioritize and plan the professional development offerings for teachers. In determining topics to address, clearly a concern exists among all teachers for statewide training in the areas of: Preparing proficiency and degree applications, writing grant proposals for external funding, and making changes to the local program which will help attract and retain high quality students.

Because time and resource constraints will limit the number of sessions offered, these results should be made available to the district professional development coordinators so that inservice needs specific to each district could be addressed at the district level. Each of the seven districts found at least one item in the top ten responses that was unique to that district. These items should be the first to be considered when planning district specific training programs.

A constant challenge for state inservice committees is the fact that individual teachers have individual needs. Planning one intensive training session per year often does not effectively meet the needs of all teachers. The Kansas Professional Development and Inservice Committee should consider involving successful teachers in the training of their colleagues. More experienced teachers could be utilized to provide guidance on ways to secure external funding, and develop a positive image for the local agricultural education program. Teachers with more computer proficiency and greater exposure to biotechnological advances could be utilized in training those teachers who feel a need for experience in these areas. Additional sources of expertise related to technical agriculture topics could be secured from agriculture industry leaders to provide a variety of training opportunities. Allowing teachers to choose training on the topics they need the most by offering a variety of programs throughout the summer or academic year would be an effective method to address the needs of more agriculture teachers.

A systematic follow-up should be conducted to determine if and how the needs have changed. Further research is needed to determine if the findings of this particular state are similar to other states, and if the needs according to years of experience are similar in other states. Finally, additional research in Kansas is needed to identify the methods of delivery for the most efficient and effective inservice training for agriculture teachers with all ranges of experience and from all geographic locations.

References

Birkenholz, R. & Harbstreit, S. (1987). Analysis of the inservice needs of beginning vocational agriculture teachers. Journal of AATEA, 28(1) 41-49.

Briers, G. & Edwards, M. (1998) Assessing inservice needs of entry-phase agriculture teachers in Texas. Proceedings of the Seventeenth Annual Western Region Agricultural Education Research Meeting. p.127-139. Salt Lake City, UT.

Claycomb, D. & Petty, G. (1983) A three year longitudinal study of the perceived needs for assistance as rated by vocational agriculture instructors. Journal of AATEA, 24(4), 28-33.

Foxwell, S. (1987) Statewide VTAE Staff Training Needs Assessment. (Eric Document Reproduction Service No. ED 331 961)

Gamon, K., Miller, W., & Roe, R. (1994) Inservice needs and delivery method preferences of Iowa high school agriculture teachers. Proceedings of the 21st Annual National Agricultural Education Research Meeting. p.216-221. Dallas, TX.

Garton, B.L. & Chung, N. (1996) The inservice needs of beginning teachers of agriculture as perceived by beginning teachers, teachers educators, and state supervisors. Journal of Agricultural Education, 37(3) 52-58.

Hachmeister, M.H. (1981). Meeting needs of first- and second-year teachers. Proceedings of the 1981 Central States Seminar in Agricultural Education. Chicago, IL.

Hillison, J. (1977). The concerns of agricultural education preservice students and first year teachers. The Journal of the American Association of Teacher Educators in Agriculture, 18(3), 33-39.

Kahler, A.A. (1974) Organizational and instructional problems of beginning teachers of vocational agriculture. Ames: Iowa State University, Department of Agriculture Education.

King, B.O., & Garton, B.L. (2000) An analysis of the professional development needs of agriculture teachers. Proceedings of the 54th Annual AAAE Central Region Research Conference in Agricultural Education. p. 152-161. St. Louis, MO.

Layfield, K.D., & Dobbins, T.R. (2000) An assessment of South Carolina agriculture teachers' inservice needs and perceived competencies. Proceedings of the 27th Annual National Agricultural Education Research Conference. p. 572-584. San Diego, CA.

Neason, A. (1992) Analysis of agriscience teacher inservice needs. Proceedings of the Annual National Agricultural Education Research Meeting, p. 312-320. St. Louis, MO.

Newman, M. & Johnson, D. (1993) Inservice education needs of pilot agriscience courses in Mississippi. Proceedings of the Annual Southern Regional Agricultural Education Research Meeting, p. 185-194. Gatlinburg, TN.

Niven, S.M. (1993). Work-based learning: Professional training for teaching vocational education. International Journal of Vocational Education and Training, 1 (2), 5-19.

Shippy, R.D. (1981). Professional competencies needed by beginning teachers of agriculture/agribusiness. Journal of the American Association of Teacher Educators in Agriculture, 22(1), 29-34.

Valli, L. (1992) Beginning teacher problems: Areas for teacher education improvement. Action in Teacher Education, 14(1), 18-25.

Veeman, S. (1984). Perceived problems of beginning teachers. Review of Educational Research, 54(2), 143-178.

The Professional Development Needs of Kansas Teachers of Agriculture

A Critique

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This study was one of good design. The problem was clearly stated with well written objectives which led to a worthwhile analysis of the data for planning of profession development inservice in Kansas. The designation of data categories (program management and planning, student and teacher development, instruction and curriculum, and technical agriculture) provided a sharp focus on the general professional development activities being requested by respondents. A good level of internal consistency was attained for each category. A very good response percentage of 75 from the population of Kansas agricultural education instructors was attained. It is noted that a follow up of non-respondents was not conducted.

The category titles, while not uniquely creative, give rise to a consideration of priority within the profession of agricultural education. As educators do we place more emphasis on teaching content or teaching students? In this study, even though the four categories were all represented in the top 14 needs only 2 spoke specifically of students. The authors recommend that further research include determining if the results of this Kansas study are comparable in other states. This may provide insight to the proposed question of emphasis on content or students. Could it be that teachers when asked for their opinion on inservice needs "don't know what they don't know (unconscious incompetence)?"

One of the top five needs identified in this study was recruiting and retaining quality students. A question I ask of the authors is, "how is the word quality to be interpreted?" Is it grade point average? Is it critical thinking ability? Is it problem solving ability? Is it academic potential as expressed through an ACT score? The list of questions could go on. In reference back to the issue of content or student emphasis, it is apparent that in agricultural education we've always attracted active learners. In fact, we've attracted a large percentage of teachers based on that premise of teaching in an active delivery. Are quality students active learners? Do we know the instructional needs we have for attracting and retaining quality students?

The results of this study as reported certainly answer the objectives as put forth in support of the purpose of this study. Clearly, three needs have been identified as common to instructors in all districts and at all experience intervals. These would seem appropriate for delivery at a state called meeting. The recommendation of further research to identify methods of delivery to be responsive to all ranges of experience and geographical location seems critical to following through in the efficient use of secondary instructors as inservice providers.

The authors are congratulated on a tight, well designed study, and for possibly provoking further thought on the inservice issue of content/program or student emphasis.

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